THIS IS ONE VOLUME OF A SIX VOLUME SET WHICH INCLUDES:

VOLUME I: FIELD OPERATIONS (FO)
VOLUME II: GROUNDWATER (GW)
VOLUME III: GEOTECHNICAL (GT)
VOLUME IV: SURFACE WATER (SW)
VOLUME V: ECOLOGY (EE)
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SW.28	Field Locating Effluent Pathways and Drains	0	09/25/92
SW.29	Dye Testing Building Drains	0	09/29/92
SW.30	Field Locating Chemicals of Concern	0	09/25/92
SW.33	Dye Testing Foundation Footing Drains	0	09/29/92

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ENVIRONMENTAL MANAGEMENT DOCUMENT CHANGE NOTICE (DCN)

Procedure Number 5-21000-OPS-SW.6, Rev. 2

Title	Date	DCN Number
Sediment Sampling	9-24-92	5-21000- 92.02

Expires 9-24-93 Procedure Revision Required [X] Yes [ ] No Kam

Scope Limitation None

Item Number	Page	Step or Paragraph	Changes (Use DCN CONTINUATION SHEET for Additional Space)
1	16 of 21	5.4.3.2	Change sentence to: Lower the sampling device through the portal in the center of the boat or over the side of the boat.

Justification (Reason for Change – Provide Numbers To Reference Corresponding Items Above)

To use the sampling port constructed in the center of the boat which was constructed to facilitate sampling and improve worker safety conditions.

Concurrence	Organization	Req	Date	Concurrence	Organization	Req	Date
	QAPM	X	9/29/92	E Cmost	User	X	9/24/92
	USEP		9/24/92				
	EOM	X	9/28/92				

Approval of Responsible Manager	Date	Is Posting Reqd?	If Yes, By What Date?	Date Posted
	25-9-92	[X] Yes [ ] No		

DCN Form 001

POND AND RESERVOIR BOTTOM SEDIMENT SAMPLING

Approved By:

M. B. Arnold For R.L. Bradley 9/25/92

Associate General Manager
Environmental Restoration

Date

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1. PURPOSE

The purpose of this document is to establish approved procedures for obtaining core samples of pond and reservoir bottom sediments using hand-held corers, gravity corers, US-BM60, and dredge bottom-material samplers. Sample collection, preparation, and preservation are described herein.

2. SCOPE

This procedure will be used to obtain bottom sediment samples from ponds located on the Rocky Flats Plant (RFP) and reservoirs located off plant site. The devices used to obtain these samples are gravity corers and hand-held corers, for obtaining core samples of bottom material, and US-BM60 and Eckman Grab (dredge) samplers for obtaining grab samples from the top several centimeters of pond and reservoir bottom sediments. Sample collection and preservation as well as other data-collection activities associated with bottom material sampling are addressed herein. Procedures described herein provide detailed instruction of general procedures described in SOP SW.6, Sediment Sampling. Therefore, this SOP should be used in conjuction with SW.6 as appropriate; depending on the type of sample desired.

3. REFERENCES

3.1 Primary References

3.1.1 5-21000-ADM-FO.02, Transmittal and Field QA Records.

3.1.2 3-21000-ADM-17.01, Quality Assurance Records Management.

3.1.3 5-21000-ADM-FO.03, General Equipment Decontamination

3.1.4 5-21000-ADM-FO.04, Heavy Equipment Decontamination

3.1.5 5-21000-ADM-FO.06, Handling of Personal Protective Equipment

3.1.6 5-210000-ADM-FO.07, Handling of Decontamination Water and Wash Water

3.1.7 5-21000-ADM-FO.09, Handling of Residual Samples

3.2 Secondary References

3.2.1 Benthos Corporation Instruction Manual for the Benthos Model 2171 Gravity Corer

3.2.2 Guy, H.P., and Norman, V.W., 1982, "Field Methods for Measurement of Fluvial Sediment," Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 3, Chapter C2, GPO, Washington.

3.2.3 U.S. Geological Survey, Water Resources Division, Colorado District, 1992, oral and written communications.

3.2.4 EM Department Environmental Requirements Manual, 1-21000-ERM-SW.02.

3.2.5 Edmondson, W.T. and Winberg, G.G., 1971, "A Manual for the Assessment of Secondary Productivity in Fresh Waters," Allard and Son, Ltd, Bartholomew Press, Osney Mead, Oxford.

3.2.6 Ben Meadows Company 1992 Catalog.

3.2.7 Welch, P.S., 1948, "Limnological Methods," McGraw-Hill, New York, pp 176-178.

4. LIMITATIONS AND PRECAUTIONS

4.1 Personnel shall consider the potential hazards of boating and mechanical hazards of working with heavy equipment such as weights, cables, reels, and pipes. Personnel shall not put themselves or others at undue risk.

4.2 Personnel who implement this procedure must be physically capable of hoisting a 150 kilogram sampler using a USGS E-type sounding reel and 6 foot boom.

5. PREREQUISITES

5.1 Personnel shall be familiarized/trained in implementing this procedure and with the use of the equipment described herein prior to implementing the following procedures for sample collection. Personnel logging cores will be trained as required by 5-21000-OPS-GT.01.

5.2 Personnel engaged in the activities described by this procedure shall be instructed in safe boating practices; including the use of personal floatation devices (PFD).

5.3 Obtain Core Sample Data Form(s) (CSDF) and/or Sediment Sample Collection Form(s) (SSCF). All sections of the form must be completed.

6. INSTRUCTIONS

6.1 Core Sampling: Large Gravity Corer

6.1.1 Initiation of the Core Sampling Activity

NOTE

A large gravity corer might not be appropriate for coring a small, shallow pond such as an RFP detention pond. In this case, a hand-held, zero-contamination corer is used (see Section 6.2).

6.1.1.1 If a grab sample is require go to Section 6.3. This type of sample requires a Sediment Sample Collection Form (SSCF) rather than the Core Sample Data Form (CSDF) required for core samples.

6.1.1.2 Review the CSDF(s) to determine if it is complete and the locations are clear. If not contact your supervisor or designee for additional information and revise the CSDF(s) as needed consistent with the requirements of 3-21000-ADM-17.01, Quality Assurance Records Management. The Sample Tracking Representative will assign the unique datasheet numbers.

6.1.1.3 If the CSDF(s) do not have a unique sample number record one on the datasheet. If no other instruction are provided this number can be generated per Appdendix 8.

6.1.1.4 Record your name and the date on the CSDF(s), if not already present.

6.1.1.5 If a small shallow pond is to be sample go to Section 6.2.

6.1.2 Equipment Preparation and Assembly

6.1.2.1 Obtain the coring equipment. Typical equipment is shown and labeled in Appendix 1, Figures A and B. Typical coring equipment consists of the parts listed in Appendix 1.

6.1.2.2 Only major equipment components are listed in Appendix 1, obtain the required supporting supplies which include: electrical tape, duct tape, chain wrenches, bolt drivers, screw drivers, spatulas, core slicers, teflon sheets, parafilm, markers, sample jars. In addition, obtain other miscellaneous supplies needed to complete this procedure.

CAUTION

The corer should be assembled before launching the boat for convenience and safety.

6.1.2.3 Assemble the coring equipment. Guidance for assembly can be found in Appendix 2. The Figures A and B in Appendix 1, are an illustration of typical coring equipment.

6.1.2.4 Verify that all core liners to be used to take the samples have been decontaminated as per 5-21000-OPS-FO.03, General Equipment Decontamination. If this has not been accomplished decontaminate all core liner to be used per 5-21000-OPS-FO.03. Decontaminate the boat and anchor prior to sampling as required by 5-21000-OPS-SW.06, Field Sampling at Rocky Flats Plantsite. No decontamination is required for offsite sampling.

CAUTION

At no time shall personnel touch or otherwise introduce contaminants to the insides of the core liners and caps following decontamination.

6.1.2.5 Document completion/verification of core liner decontamination on the CSDF.

6.1.2.6 Verify that the core sampling equipment is secured to the boat.

6.1.2.7 **Don personal flotation devices**, and then launch the boat.

6.1.3 Core Sampling

6.1.3.1 Proceed to the approximate sampling location and then drop anchor at the desired coring location.

6.1.3.2 Record the relative positions to the shoreline, islands, or other landmarks on the CSDF. Surveying or telemetry equipment may also be used to reference the sampling location.

6.1.3.3 Determine the approximate depth. A fathometer (depth-finder) may be used to determine the approximate depth to the bottom. Sounding with a tape measure may also be used. This measurement is solely for estimating when the corer will contact the bottom.

6.1.3.4 Carefully deploy the corer off the side of the boat.

6.1.3.5 If a liner is already installed go to 6.1.3.7.

6.1.3.6 Determine the necessary liner type from the Core Sample Data Form (CSDF) (Appendix 3):

i) If the sampling is for inorganic constituents verify that a plastic core liner was used.

ii) If the sampling is for organic constituents verify that a steel core liner was used.

6.1.3.7 Check the valve assembly to make certain that the valve is free to operate against its spring pressure.

6.1.3.8 Check all fittings, and ensure that the corer is assembled properly.

6.1.3.9 Fill the coring box with lake water or dry ice to keep the cores cool.

6.1.3.10 With the corer fins at the water surface, set the zero on the E-Reel.

6.1.3.11 Slowly, lower the corer to approximately 10 to 20 feet from the bottom by slightly relieving the brake pressure on the E-Reel. The E-Reel can be used to adjust the depth if the corer is closer than 10 feet from the bottom.

6.1.3.12 Attempt to release the brake tension completely at approximately 10 to 20 feet from the bottom (gaged using the E-Reel depth gage) to allow the corer to free fall into the bottom.

6.1.3.13 If the corer is released from a depth of less than 10 feet, check to see if a complete core is obtained (i.e. a full core barrel of sediment). If a complete core is not obtained, discard the sample and repeat the process starting at Step 6.1.3.4, and lengthen the free-fall depth. Note the problem on the CSDF, no other QA documentation of this problem is required.

6.1.3.14 **AS SOON AS** the tension on the cable decreases, stop the reel to avoid laying excess cable on the deck.

6.1.3.15 Tighten the cable by hand until tension is observed, and read the depth on the E-Reel. This is the depth to the bottom, record it on the CSDF. This depth can be used for subsequent coring to indicate when to stop the reel.

6.1.3.16 Raise the corer to the deck with the E-reel. Keep the core in a vertical position at all times.

6.1.3.17 Use a piece of teflon to line the Caplug. Cap the bottom of the core liner with a plastic cap (Caplug) under the water surface **AS SOON AS** the corer comes to the surface.

6.1.3.18 Keeping the core in a near vertical attitude, one person holds the valve assembly to keep the core sample in the corer while another person disassembles the bottom of the corer.

CAUTION
When completing 6.1.3.19 do not let the lake water enter the top of the core liner.

6.1.3.19 Carefully remove the core liner and core sample from the corer by sliding the liner out of the corer (down into the water).

6.1.3.20 Remove the valve assembly, and cap the top of the core using the appropriate cap with a small slit cut in the top.

6.1.3.21 Dry the core liner with a towel or paper towels.

6.1.3.22 Tape the cap edges with electrical tape to seal the core.

6.1.3.23 Press the top cap gently to remove any head space between the cap and the water surface, and tape the top of the cap with duct tape.

6.1.3.24 Procedure 5-21000-OPS-FO.13, Containerization, Preservings, Handling and Shipping of Soil and Water Samples requires the following labels. Label the duct tape with the following information:

1. Sampling Location,
2. Sequence number of core (i.e. first, second, etc. core sampled at that location, time, and date),and
3. EG&G.
4. activity name and/or number.
5. analyses required.
6. samplers initials.

NOTE
The core box must be kept in a vertical attitude at all times.

6.1.3.25 Decontaminate the exterior of each sample container as required by 5-21000-OPS-FO.03, Section 6.2: General Equipment Decontamination, subsequent to sampling.

6.1.3.26 Place the core in the core box for storage and subsequent processing on shore.

6.1.3.27 Clean the corer with lake water to remove any gross quantities of debris/sediment before installing another core liner or before hoisting the corer onto the deck.

6.1.3.28 Install another core liner, as described in Appendix 2 Steps 6 to 16, if additional cores are to be taken.

6.1.3.29 When coring at a particular sight is completed, hoist the corer onto the deck, and secure the corer to the deck by tightening the cable and tying the corer to the deck with rope.

6.1.3.30 If additional cores are to be taken at another location, raise the anchor, and proceed to the next coring location then repeat Step 6.1.3.2 thru 6.1.3.28.

6.1.3.31 If core sampling is complete raise the anchor, and proceed to shore.

6.1.3.32 After reaching the shore, disassemble the corer by loosening the collars and disconnecting the cable from the corer. Reel up the cable and store the E-Reel in its case.

6.1.3.33 Properly store the battery by capping the terminals.

6.1.3.34 Initiate the chain of custody form per 5-21000-OPS-FO.24. The information on the sample label can be used to complete the sample data on this form. The CSDF(s) should be completed immediately after sampling.

6.1.3.35 Document any off-normal concerns in the comment section co the CSDF (s).Indicate if the core(s) is to be sectioned in the field on the CSDF and then sign and date the field collection portion of the CSDF, after 'Prepared by:'.

6.1.3.36 If the core is to be sectioned in the field go to Section 6.1.4 and otherwise arrange for transportation to the laboratory and transfer as necessary. Update the Chain-of-Custody form per 5-21000-OPS-FO.24 upon transfer of custody. Transmit data to EG&G Rocky Flats Environmental Data System (RFEDS) personnel as per 3-21000-OPS-FO.14, Field Data Management. The core must be sectioned within 2 hours of collection.

6.1.4 Core Extrusion and Sample Preparation

6.1.4.1 Set aside one core from each location for use in obtaining the physical description of the core. This core will be handled per Section 6.1.5, rather than sections 6.1.4.2 through 6.1.4.18.

6.1.4.2 Determine the intervals into which the core is to be sectioned by reviewing the task work plans.

NOTE

This task may be performed on site (on shore) or in a laboratory, but the sectioning shall be done within two hours of taking the core samples. The extrusion task (steps 6.1.4.3 to 6.1.4.18) requires two people.

6.1.4.3 The tools required for this task include a piece of flexible plastic tubing, the extrusion stick, stainless-steel or plastic core slicers, spatulas, sample containers and core sample measurement rings. The core-sample measurement rings are pre-cut and decontaminated pieces of core liner cut to the desired length of the sampling interval.

6.1.4.4 Remove a core from the core box; keeping the core vertical at all times.

CAUTION
Take care not to disturb the sediment/water interface.

6.1.4.5 Remove the top cap and siphon the overlying water off of the core using either tygon or teflon tubing; being careful not to disturb the sediment/water interface. Leave approximately 1.0 to 1.5 centimeters of water on top of the core.

6.1.4.6 Remove the tape from the bottom cap of the core and position the top of the extrusion stick (Figure B) near the bottom cap of the core. The extrusion stick consists of a handle as long as the core liner with a rubber stopper/plunger on the top end. The outside diameter of the stopper should equal the inside diameter of the liner.

6.1.4.7 The person who will be holding the core liner should stand on a platform approximately as high as the core liner is long.

6.1.4.8 Quickly remove the bottom cap, and simultaneously slide the plunger of the extrusion stick into the core liner. This procedure requires one person to hold the extrusion stick, and one person to hold the core liner.

6.1.4.9 Slowly extrude the core to the top of the liner by pushing the liner down on the extrusion stick until the core is approximately 1.0 centimeter from the top.

6.1.4.10 Hold a core-sample measurement ring flush with the top of the liner, and extrude the core out of the liner and into the measurement ring until the top of the core is approximately flush with the top of the measurement ring.

6.1.4.11 Slide a core slicer between the top of the core liner and the measurement ring; slicing the core in the process.

6.1.4.12 **Slide** the core slicer off the top of the core liner to cleanly section off the top sample.

NOTE

Use a plastic spatula for inorganic constituent samples. Use a stainless-steel spatula for organic constituent samples. The containers should be plastic for inorganic constituent samples and amber glass for organic constituents.

6.1.4.13 Transfer the core section to a pre-labeled container using a spatula.

CAUTION

Special care must be taken to ensure that no head space is left in the sample jar in containerization of the organic constituent samples (Richard Fox, USEPA, oral communication, 1992).

6.1.4.14 Gently push the sample into the sample jar so that the jar is slightly overfilled.

6.1.4.15 Cap the sample jar; being careful to keep the threads of the jar free of sample to ensure that a tight seal is obtained. Label the sample with the depth of the core, starting from 0 depth at the sediment/water interface. For example: the top 5 cm section of a core is labelled "000-005 cm". Record all sample labels in the sectioning part of the CSDF.

NOTE

Additional sample containerization procedures are contained in SOP FO.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples.

6.1.4.16 Continue to divide the core into sections and containerize the samples using the Steps above (Steps 6.1.4.7 to 6.1.4.15) using clean, decontaminated core-sample measurement rings, spatulas, and core slicers for each sample.

6.1.4.17 After the core has been completely sectioned and containerized, decontaminate the core liners, liner valve assemblies, spatulas, core slicers, sample measurement rings, caps, and extrusion stick and store the equipment as per 5-21000-ADM-FO.03, General Equipment Decontamination.

6.1.4.18 The samplers shall complete the Core Sectioning portion of the CSDF and then sign and date this portion. Document any off-normal concerns in the comment section of the CSDF(s).

6.1.5 Core Description

NOTE

Normally a physical description of the core material shall be done on one core from each sampling location.

6.1.5.1 Obtain the core(s) set aside for preparation of core descriptions in Step 6.1.4.1.

6.1.5.2 Layout a white background such as white paper.

6.1.5.3 Extrude the core (as described in Steps 6.1.4.3 to 6.1.4.9) horizontally onto a white background (see Step 6.1.5.2).

6.1.5.4 Split the core in half longitudinally with a spatula, and open the core to reveal the middle of the core.

6.1.5.5 Align a measuring instrument such as a yard stick, or measuring tape along the side of the core with the zero mark at the top of the core.

CAUTION

Personnel using photographic equipment on RFP shall comply with the applicable security requirements for possession of such equipment.

6.1.5.6 Photograph and qualitatively describe the core material in terms of color, texture, and composition on a CSDF. The core description color shall be determined using original Munsell standards.

Note

"Munsell" is a registered trademark.

6.1.5.7 Measure the positions of distinctly colored and/or textured layers of the core with a ruler, tape, or meter stick by measuring from the top of the core, and record the positions on the CSDF.

6.1.5.8 After the core description is complete, dispose of the core materials as per procedures in SOP FO.09, Handling of Residual Samples.

6.1.5.9 Complete the balance of Core Description portion of the CSDF and then sign and date this portion. Document any off-normal concerns in the comment section of the CSDF(s).

6.1.5.10 If additional cores remain to be described repeat Steps 6.1.5.1 to 6.1.5.9.

6.2 Core Sampling: Hand-Held Corers

NOTE

A large gravity corer might not be appropriate for coring a small, shallow pond such as an RFP detention pond. In this case, hand-held, zero-contamination, drive corers or hand-held gravity corers are used (Figure C in Appendix 4).

6.2.1 Equipment

6.2.1.1 Obtain a hand-held, drive corer or gravity corer (see Appendix 4). The drive corer should be used if one or both of the following apply: (1) the desired core length is greater than 3-feet long; (2) the bottom material is too coarse to obtain a sample with the drive sampler, otherwise the hand-held gravity corer is recommended.

NOTE

The drive corer consists of a stainless-steel core barrel and either plastic or stainless-steel, zero-contamination liners. A nose cone or a catcher is attached to the end of the corer to keep the core sample in the liner (Figure C in Appendix 4). A T-type handle with extension rods are attached to the core barrel. A slide hammer attachment is used to drive the corer into the bottom material if necessary. The hand-held gravity corer is analogous to the large garvity corer described in section 6.1 (Figure D in Appendix 4); only the hand-held version is much smaller. The core extrusion equipment used to extrude the sample from the corer is the same as the equipment used for the larger gravity corer (Steps 6.1.4.3 to 6.1.4.9).

6.2.1.2 Obtain the tools needed for extrusion. This includes core-sample measurement rings, core slicers, spatulas, and an extrusion stick.

NOTE

The core barrels for the hand-held corers are approximately 2.0 to 3.0 feet long; whereas the core barrel for the large gravity corer is approximately 5.0 to 6.0 feet long. Therefore, the extrusion stick for the smaller hand-held corer need only be about 3.0 to 4.0 feet long. See Step 6.1.4.3 for further details on core extrusion equipment. Specifications for the hand-held zero-contamination corers are listed in Appendix 4.

6.2.1.3 Assemble the hand-held drive corer as described by the manufacturer's instructions.

6.2.1.4 Verify the liner type on the Core Sample Data Form (CSDF) (Appendix 5):

i) If the sampling is for inorganic constituents verify that a plastic core liner was used.

ii) If the sampling is for organic constituents verify that a steel core liner was used.

6.2.1.5 Decontaminate all components that will come in contact with the sample per procedures in 5-21000-ADM-FO.03, General Equipment Decontamination prior to sampling.

6.2.1.6 Install the appropriate liner into the corer as described in the manufactures instructions. If a liner is already installed go to the next step.

CAUTION

At no time shall personnel touch or other sources introduce contaminants to the insides of the core liners and caps.

6.2.2 Sampling with the Hand-Held Drive Corer

6.2.2.1 **Don personal flotation devices**, and then launch the boat.

6.2.2.2 Proceed to the approximate sampling location and then drop anchor at the desired coring location.

6.2.2.3 Verify and reference the location by recording relative positions to the shore line, islands, or other landmarks on the CSDF. Surveying or telemetry equipment may also be used to reference the sampling location.

6.2.2.4 Attach extension rods to the corer, and lower the corer down into the water.

6.2.2.5 Add extension rods until the corer reaches the bottom.

6.2.2.6 Attach either the T-handle or the hammer attachment to the top extension rod and force the corer into the bottom sediments until the entire core barrel is embedded in the bottom material or until considerable force is required to drive the corer deeper. The T-handle may be used in loosely consolidated sediments, but the hammer will be needed for more compact sediments.

6.2.2.7 Retrieve the corer by pulling the core straight out of the bottom. Keep the corer vertical at all times.

6.2.2.8 Disassemble the extension rods as the corer is brought to the surface.

6.2.2.9 **AS SOON AS** the corer is brought aboard the boat, remove the catcher and cap the bottom of the core liner.

6.2.2.10 Remove the core liner from the core barrel and cap the top of the core.

6.2.2.11 Dry the core barrel with a towel or paper towels, and tape the caps to the core liner with electrical tape.

6.2.2.12 Place a piece of duct tape on the core liner as a label for the core. Label the duct tape with the following information using a permanent marker:

1. Sampling Location,
2. Sequence number of core (i.e. first, second, etc. core sampled at that location, time, and date),
3. EG&G
4. activity name and/or number
5. analyses required
6. sampler's initials

NOTE
The core box must be kept in a vertical attitude at all times.

6.2.2.13 Place the core in the core box for storage and subsequent processing on shore.

6.2.2.14 Clean the corer with lake water to remove any gross quantities of debris/sediment before installing another core liner or before lifting the corer onto the deck.

6.2.2.15 If additional cores are to be taken, raise the anchor and proceed to the next coring location, then repeat steps 6.2.2.4 thru 6.2.2.14.

6.2.2.16 If core sampling is complete raise the anchor, and proceed to shore.

6.2.2.17 Disassemble the corer, and store it in its case.

6.2.2.18 Go to section 6.1.4 for core sectioning and description procedures and sample preparation.

6.2.3 Sampling with the Hand-Held Gravity Corer

6.2.3.1 A hand-held gravity corer is used to obtain core samples in shallow water (less than 20 feet) where a core sample of the top 3-feet (or less) of bottom sediment is desired. See Appendix 4-Figure F for an illustration of the hand-held gravity corer.

6.2.3.2 Decontaminate the hand-held gravity corer components as described in steps 6.2.1.4 through 6.2.1.6.

6.2.3.3 Refer to Appendix 4 for assembly instructions for the hand-held gravity corer.

6.2.3.4 Prepare for sampling by following steps 6.2.2.1 through 6.2.2.3.

6.2.3.5 Cock the valve cap on top of the corer so that the spring-loaded catch mechanism is holding the notch on the valve shaft (Appendix 4-Figure G).

6.2.3.6 Secure the end of the corer retreiving rope to the boat. Suspend the corer over the side of the boat by the hoisting rope, and release the rope to allow the corer to free fall into the bottom sediment.

6.2.3.7 Hold the retreiving rope taught, and clip the brass-swivel messanger onto the rope. Release the messanger to trigger the spring-loaded catch mechanism; thereby sealing the top of the corer with the valve cap.

6.2.3.8 Hoist the corer by hand to the water surface and go to step 6.2.2.9 to continue core sample processing, decontamination, and documentation procedures.

6.3 Bottom-Sediment Grab Sampling

NOTE

The preferred equipment for obtaining pond and reservoir bottom sediment samples is the Eckman Grab (Dredge) and the USBM-60 bottom sediment sampler. The Eckman Grab is preferred because of its ease of operation and the large sample size it provides. The USBM-60 sampler is useful for obtaining samples with minimal fine particulate loss in retrieving the sample from the bottom, but the USBM-60 does not obtain the large quantity of sample that the Eckman Grab provides.

6.3.1 Initiation of Bottom-Sediment Grab Sampling Activity

6.3.1.1 Review the SSCF(s) to determine if the documentation is complete and the location is clear. The Sample Tracking Personnel will assign the sample sequence number(s) prior to sampling. If additional information is required contact your supervisor or designee for additional information and revise the SSCF(s) as needed to be consistent with the requirements of 3-21000-ADM-17.01, Quality Assurance Records Management.

6.3.1.2 If the SSCF(s) does not have a unique datasheet number record one on the datasheet. If no other instructions are provided this number can be generated as described in Appendix 8.

6.3.1.3 Record your name and the date on the SSCF(s), if not already present.

6.3.1.4 Record on the datasheet your knowledge of the sample required and any instruction from your supervisor, regarding whether the Eckman Grab or the USBM-60 sampler should be used.

NOTE

The Eckman Grab is described in Appendix 6. The USBM-60 sampler is described Appendix 7. The instructions/guidance for operation of these samplers are located in these Appendices. Both samplers require the use of a reel and boom (Figure A of Appendix 1) to lower the samplers to the bottom and retrieve the sampler once the sampling mechanisms are tripped with a sounding messenger.

6.3.1.5 Obtain either Eckman Grab or USBM-60 samplers (or if needed both samplers) per the instructions of your supervisor.

6.3.1.6 Obtain the reel and boom equipment described in Appendix 1 (the core equipment is not required). Typical equipment is shown and labeled in Appendix 1 Figures A and B.

6.3.1.7 Only major equipment components are listed in Appendix 1 Also obtain the required supporting supplies such as electrical tape, duct tape, chain wrenches, bolt drivers, screw drivers, spatulas, markers, sample jars, and other miscellaneous supplies.

NOTE

Similar equipment that meets the above specifications may be substituted.

CAUTION

The equipment should be assembled before launching the boat for convenience and safety.

6.3.1.8 Assemble the reel and boom equipment and attach the sampler (Steps 1 to 4 and 17 of Appendix 2). Guidance for assembly can be found in Appendix 2. Figure C in Appendix 1 is an illustration of typical boom and reel equipment.

6.3.1.9 Decontaminate the sampler as per 5-21000-OPS-FO.03, General Equipment Decontamination. Decontaminate the boat and anchor prior to sampling as required by 5-21000-OPS-SW.06, Field Sampling at Rocky Flats Plantsite. No decontamination of the boat is required for offsite sampling.

CAUTION
At no time shall personnel touch or otherwise introduce contaminants to the insides of the sampler following decontamination.

6.3.1.10 Verify that the sampling equipment is secured to the boat.

6.3.1.11 **Don personal flotation devices**, and then launch the boat.

6.3.1.12 Proceed to the approximate sampling location and then drop anchor at the desired coring location.

6.3.1.13 Verify and reference the location by recording relative positions to landmarks on the shore line, islands, or other landmarks on the SSCF. Surveying or telemetry equipment may also be used to reference the sampling location.

6.3.1.14 Take the sample by slowly lowering the sampler to the bottom with the reel and boom and tripping the sampling mechanism as described in Appendices 6 and 7.

CAUTION
Care should be taken to process samples for organic constituents as quickly as possible.

6.3.1.15 Upon hoisting the bottom sediment samplers to the surface, the sediments should be processed and containerized for analysis according to Section 5.4.2 of 5-21000-ADM-SW.06, Sediment Sampling.

6.3.1.16 When containerizing the sample verify that:

a. **no** head space exists in the sample container, and

b. the threads on the container are free of debris to ensure that the sample container seals tightly.

c. the sample container will be labelled in accordance with 5-21000-OPS-FO.13.

6.3.1.17 Decontaminate the sampler between samples and prior to storing the sampler after use according to 5-21000-ADM-FO.03, General Equipment Decontamination.

6.3.1.18 If additional samples are to be taken raise the anchor, and proceed to the next location and repeat steps 6.3.1.9 thru 6.3.17.

6.3.1.19 If sampling is complete raise the anchor, and proceed to shore.

6.3.1.20 Disassemble the corer by loosening the collars and disconnecting the cable from the corer. Reel up the cable and store the E-Reel in its case.

6.3.1.21 Properly store the battery by capping the terminals.

6.3.1.22 Initiate the chain of custody form per 5-21000-OPS-FO.24. The information on the sample label can be used to complete the sample data on this form.

6.3.1.23 Document any off-normal conditions in the comment section of the CSDF(s). Complete the SSCF(s) for the samples. Then sign and date the SSCF (s) after 'Prepared by:'.

6.3.1.24 Arrange for transportation to the storage or laboratory per the directions on the SSCF(s) or from your supervisor. Update the Chain-of-Custody form per 5-21000-OPS-FO.24 upon transfer of custody. Transmit data to RFEDS per 3-21000-OPS-FO.14, Field Data Management.

6.4 Waste Management

Wastes such as personal protective equipment, excess sample materials, paper towels, decontamination water, and so forth shall be handled according to procedures outlined in the following procedures:

- 5-21000-ADM-FO.03, General Equipment Decontamination
- 5-21000-ADM-FO.04, Heavy Equipment Decontamination
- 5-21000-ADM-FO.06, Handling of Personal Protective Equipment
- 5-210000-ADM-FO.07, Handling of Decontamination Water and Wash Water
- 5-21000-ADM-FO.09, Handling of Residual Samples

7. RECORDS

The CSDF and SSCF will be QA records when completed, but they are not complete at the conclusion of this procedure. Completion of these records requires verification per 5-21000-ADM-FO.14, Field Data Management.

Initiate the chain of custody form per 5-21000-OPS-FO.24, Chain of Custody. Then transmit data to RFEDS per 3-21000-OPS-FO.14, Field Data Management.

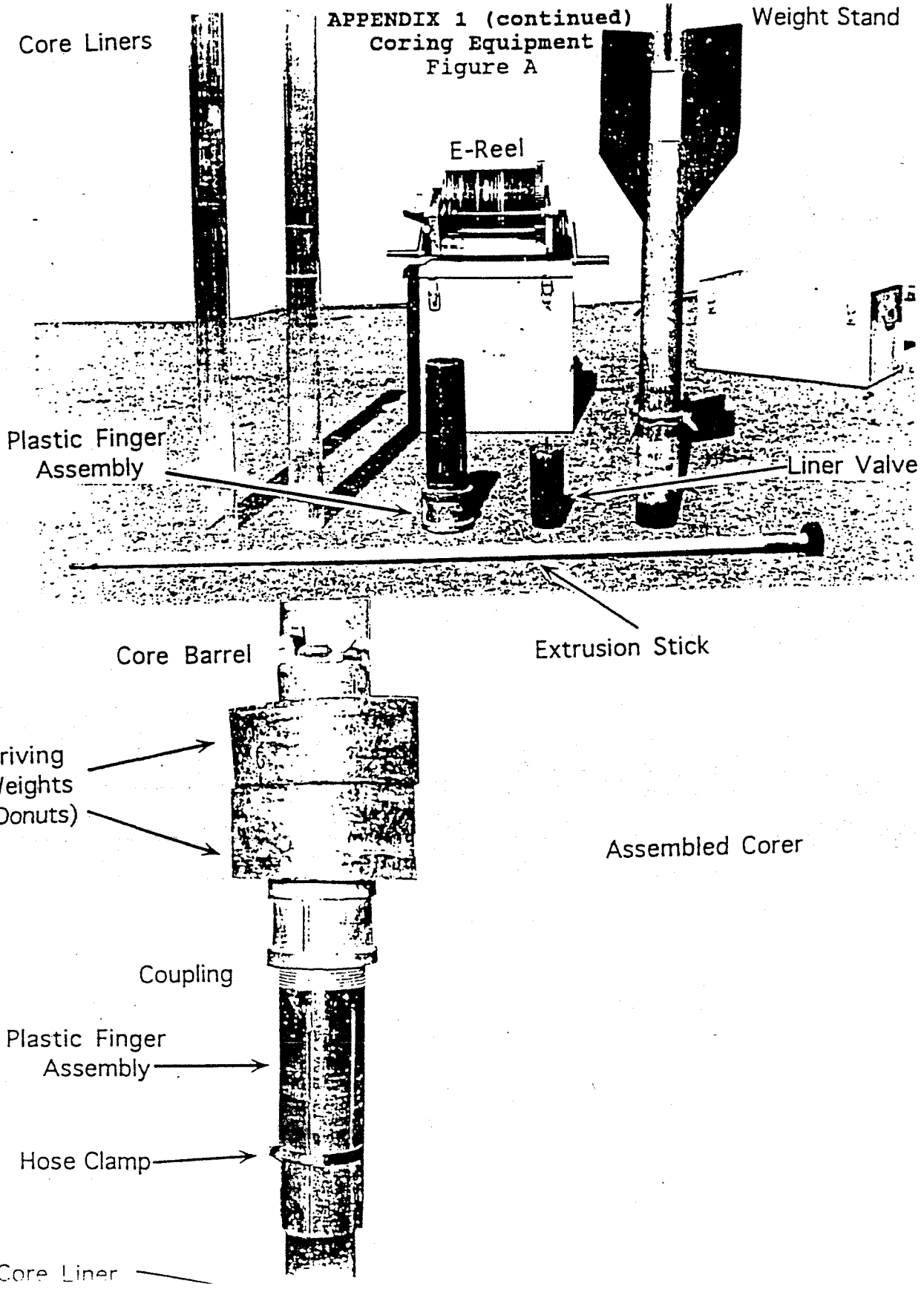
APPENDIX 1
Coring Equipment

Part	Material	Approximate Dimensions	Figure(s)
Weight Stand	Galvanized Steel	4'-long 16"-Dia.	A
Driving Weights	Lead	50 kilograms/EA	A
Couplings	Galvanized Steel	2.9" I.D., threaded	A
Core Barrel	Galvanized Steel	Must fit Couplings 2.9" I.D.	A
Core Liner	Clear Plastic or Stainless Steel	2.9" O.D. 2.6" I.D.	A&B
Nose Cone	Brass	Must fit end of core barrel	not shown
Benthos Liner Valve Assembly	PVC and Steel	Must fit end of core liner	A&B
Liner Caps	#45 "Caplugs"	2.9" I.D.	B
Plastic Fingers	PVC attached to galvanized coupling	Must fit core barrel end	A&B
Hose Clamps	Steel	To fit Core Barrel	A&B

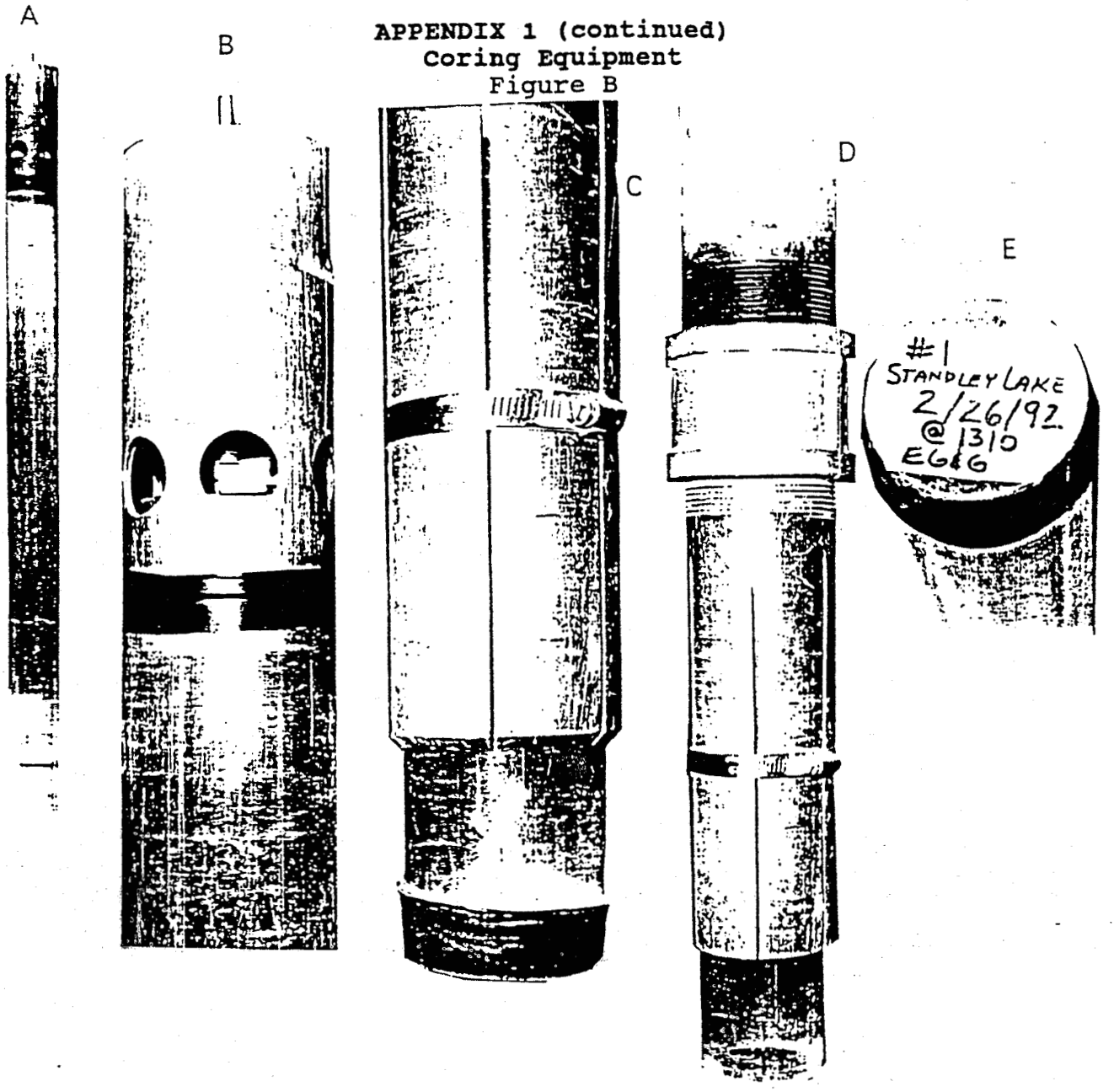
APPENDIX 1 (continued)
Coring Equipment

Part	Materials	Dimensions	Figure(s)
Carabiner	Steel	3/8" O.D.	D
USGS E-Reel with Steel Cable	Steel	Cable must be at least 125 feet long	C
Marine 12-Volt	Battery	Used to power E-Reel	Not shown
Boat with 6-8'	Boom	At least 30' long	Not shown
Core Storage Box	Wood or Plastic	Should contain cores in cool, dark environment	Not shown

APPENDIX 1 (continued)
Coring Equipment
Figure A



APPENDIX 1 (continued)
Coring Equipment
Figure B



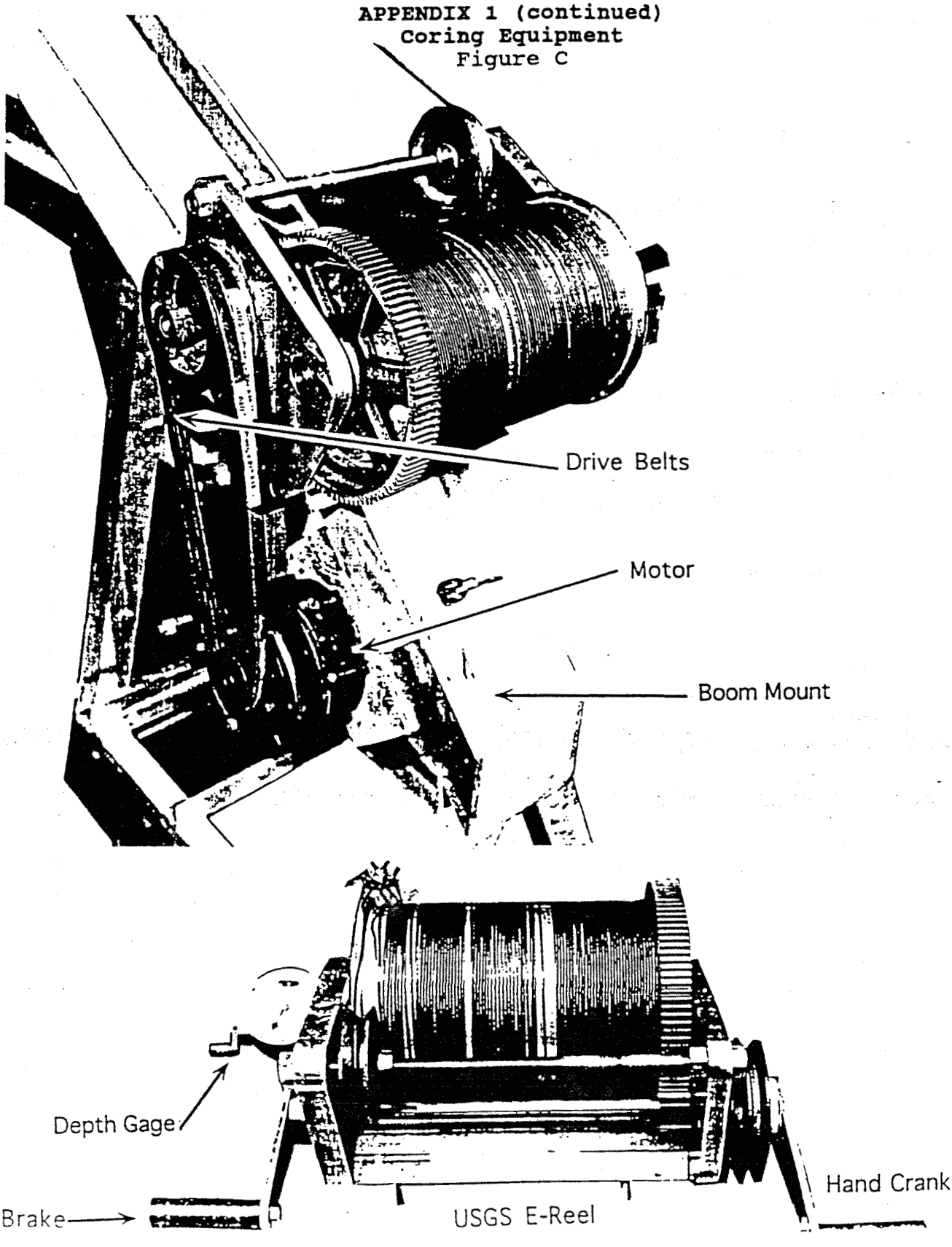
A&B -- Assembled Core Liner with Liner Valve Assembly

C -- Core Liner Installed in Weight Stand and Finger Assembly

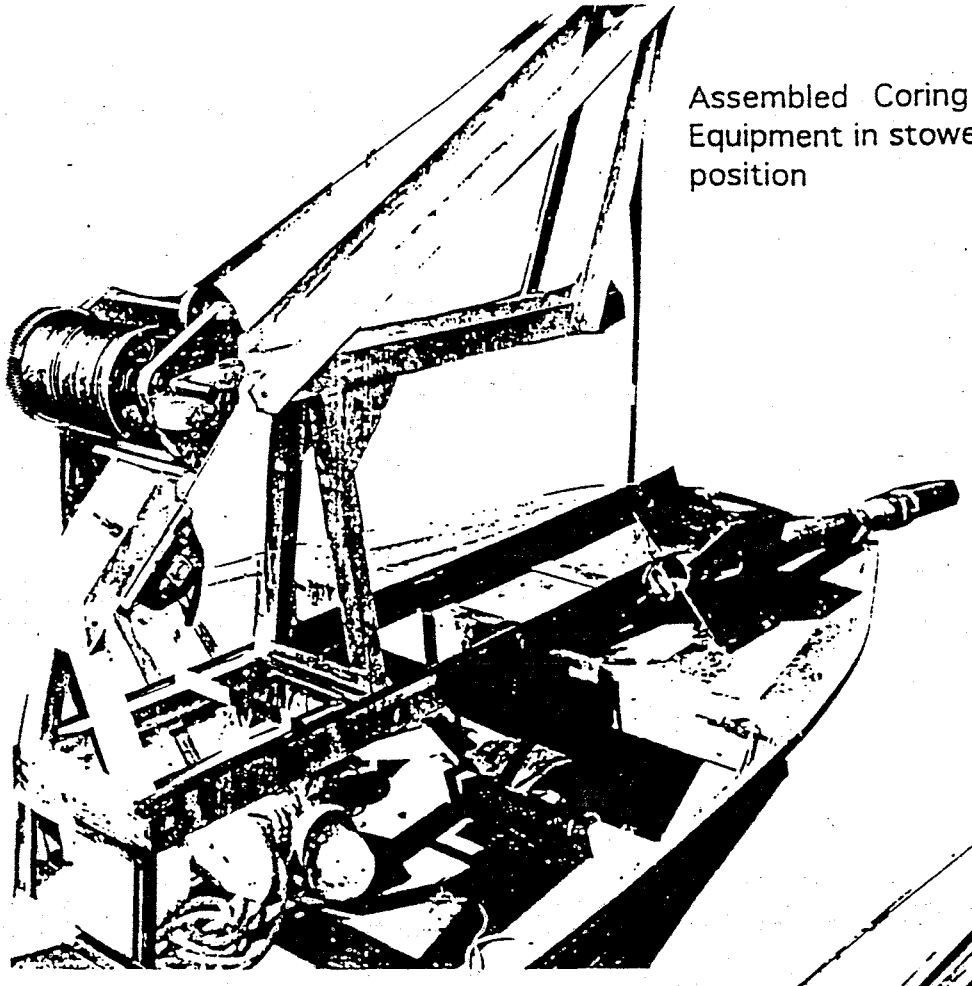
D -- Capped Core Liner After Core Sample is Collected

E -- Capped and Labeled Core Sample

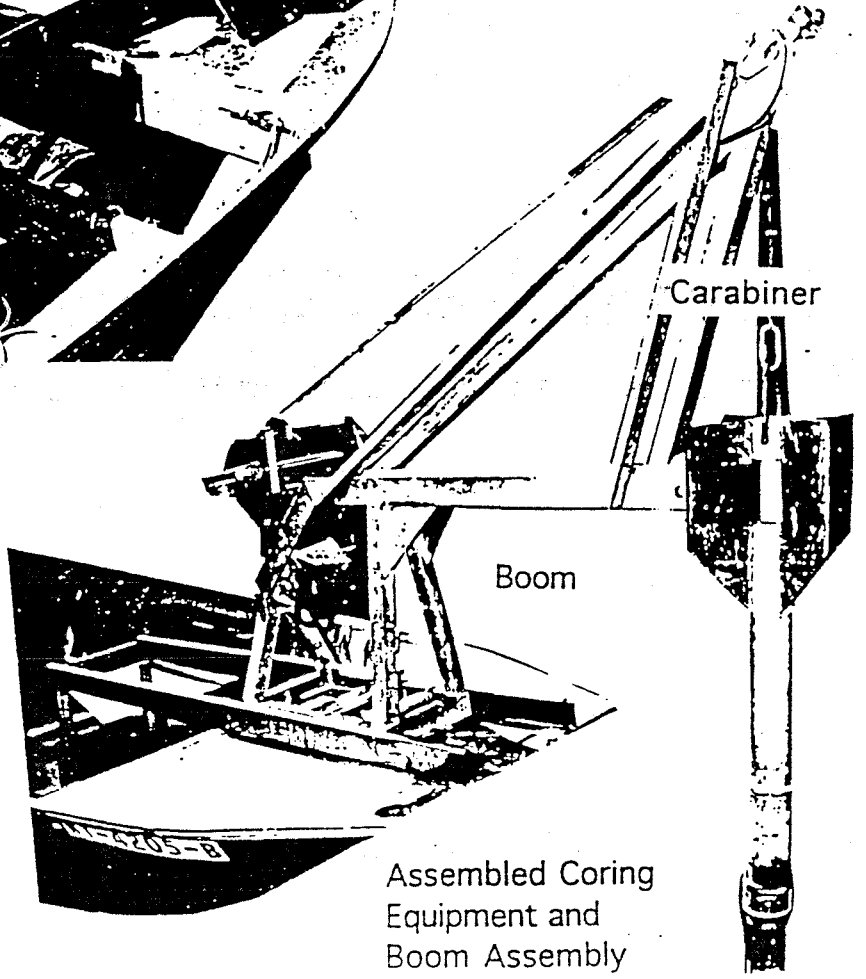
APPENDIX 1 (continued)
Coring Equipment
Figure C



APPENDIX 1 (continued)
Coring Equipment
Figure D



Assembled Coring Equipment in stowed position



Assembled Coring Equipment in sampling position

Assembled Coring Equipment and Boom Assembly

APPENDIX 2
Coring Equipment Assembly Instructions

1. Assemble the tools required for assembly of the gravity coring equipment (e.g., screwdriver, boltdriver, chain wrench, and pliers).

2. Attach the E-Reel to the boom as per the manufacturer's instructions, and thread the cable through the boom.

3. Attach the cable to the top of the weight stand with the carabiner.

4. Attach the battery to the E-Reel using cables supplied with E-Reel.

5. Slide the driving weights onto the weight stand. Vary the number of driving weights according to the degree of consolidation of the bottom sediments.

6. Push the liner valve assembly onto the top of a decontaminated core liner.

NOTE

The core liners should be decontaminated as per SOP FO.03, General Equipment Decontamination.

7. Seal the joint between the liner and the valve assembly with one or two turns of electrical tape.

8. Ensure that the core liner contacts only clean, decontaminated materials during all steps prior to sampling.

9. Plastic core liners are to be used only for inorganic constituent sampling. If sampling for organic constituents go to step 14.

10. Screw the plastic fingers assembly onto the end of the core barrel and tighten the assembly with a chain wrench until secure.

11. Insert the plastic core liner into the core barrel with the liner valve assembly up.

APPENDIX 2 (continued)
Coring Equipment Assembly Instructions

12. Finally, secure the liner in the corer by tightening two hose clamps around the fingers using either a screwdriver or a bolt driver until secure.

13. Go to step 17

14. Stainless steel liners are used for organic constituent sampling.

15. Add additional sections of the corer into the core barrel until the barrel is full.

16. Attach the brass nose cone to the end of the core barrel to secure the liner in the barrel.

17. Secure the assembled corer to the deck of the boat by taking up any slack on the cable and tying the corer to the deck with rope.

APPENDIX 3
Core Sample Data Form (CSDF)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT Page 1/2
Core Sample Data Form (CSDF)
Form SW.17A

SAMPLE ID:_____ Site ID:_____
LOCATION_____
CORE NUMBER:_____Liner Decontaminated: Yes / NO
REQUEST FOR ANALYSIS NUMBER:_____CHAIN OF CUSTODY NUMBER:_____SHIP DATE:_____
CORE LINER: Organics-Stainless Steel / Non-Organics-Polybutyrate NORTH OR Y:_____ EAST OR X:_____
COLLECTION DATE:_____ QUARTER: 1 2 3 4
COLLECTION TIME:_____ PURPOSE/PROJECT_____PROJECT CHARGE NUMBER:_____
COMPOSITE: YES / NO COMPOSITE DESCRIPTION:_____
QC TYPE: REAL MS MSD LR DUP RNS QC PARTNER_____
COLLECTION METHOD: GRAVITY CORER HAND-HELD CORER
TYPE OF SAMPLE: METALS RADIONUCLIDES VOLATILES SEMI-VOLATILES DESCRIPTION
OTHER:_____
DEPTH OF WATER:_____(FEET) TOTAL LENGTH OF CORE:_____(FEET)
SECTIONED CORE: YES / NO: IF YES, COMPLETE CORE SECTIONING PORTION ON PAGE 2/2.
WEATHER:_____
COMMENTS:_____

CORE DESCRIPTION

DEPTH FROM TOP (cm or inches)	COLOR	TEXTURE	OTHER FEATURES / OBSERVATIONS (ex. Vegetation, Roots, Organisms, Objects)

Sampler:_____

Prepared By:_____
Print Name Signature Date

Transmitted to RFEDS By:_____
Print Name Signature Date

RFEDS Data Verified By:_____
Print Name Signature Date

APPENDIX 3 (Continued)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT Page 2/2
Core Sample Data Form (CSDF)
Form SW.17A

SAMPLE ID:_____ Site ID:_____
LOCATION:_____
CORE NUMBER:_____ REQUEST FOR ANALYSIS NUMBER:_____
CHAIN OF CUSTODY NUMBER:_____

Core Sectioning Information

Core Section Number	Sample Number	Analysis Types	Chain of Custody Number

Sampler:_____

Prepared By:_____
Print Name Signature Date

Transmitted to RFEDS By:_____
Print Name Signature Date

RFEDS Data Verified By:_____
Print Name Signature Date

APPENDIX 4

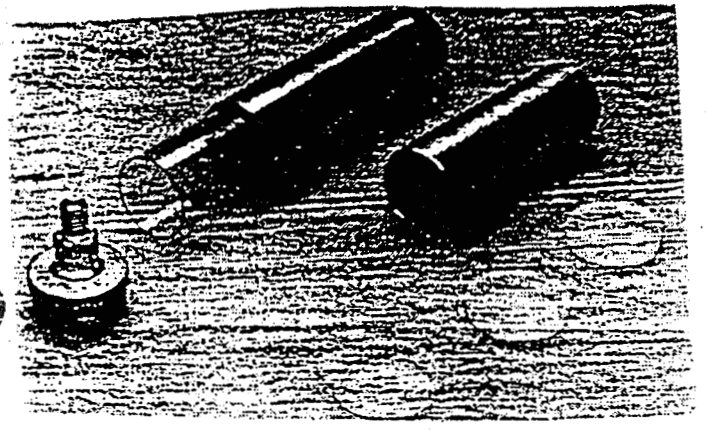
Hand-held, Drive Coring Equipment Specifications.

Part	Material	Approximate Dimensions
Core Barrel with Cap	Stainless-Steel	3 ft. long x 2 in. I.D.
Core Liner	Butyrate or Stainless-Steel	To Fit Core Barrel
Core Liner Caps	Butyrate	To Fit Liners
Hammer Attachment	Steel	20 in. long-11 pounds
Cross Handle and Extensions	Chrome-Molybdenum	16 in.-long Handle 5-ft Extensions
Core Catcher	Stainless-Steel	To Fit Core Barrel

APPENDIX 4 (Continued)

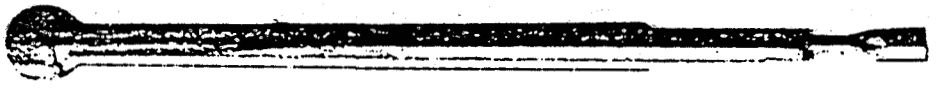
Hand-held, Drive Coring Equipment Specifications.
Figure E

Core Sampler

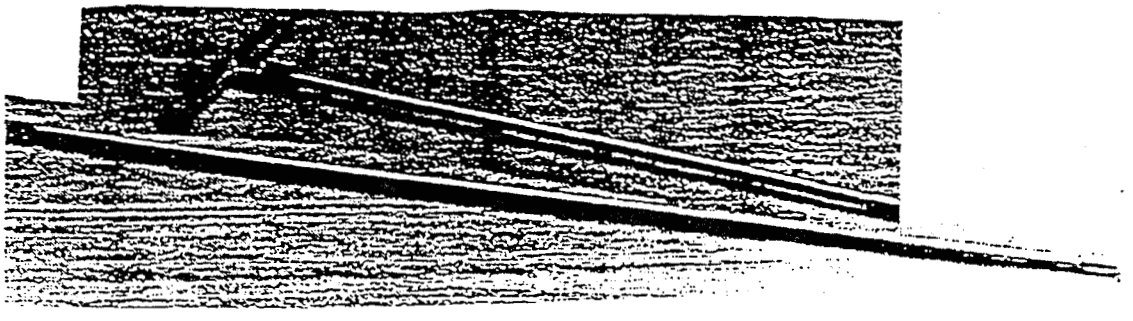


CORE CATCHER

HAMMER ATTACHMENT



Cross Handle and Extensions



APPENDIX 4 (Continued)

Assembly Instructions for the Hand-held Gravity Corer

NOTE

No tools are required to assemble the hand-held gravity corer.

1. Thread the core barrel into the fin assembly and hand tighten.

2. Thread 1/4-inch nylon rope into the top of the fin assembly. The rope should thread through a small hole in the top of the fin assembly. Tie at least two overhand knots in the end of the rope to secure the corer onto the rope.

NOTE

The rope should be at least ten feet longer than the depth of the water.

3. Test the knots in the rope to be certain that the corer will not slide off of the end of the rope.

4. Insert a decontaminated core liner into the core barrel.

NOTE

The core liners should be decontaminated as per SOP FO.03, General Equipment Decontamination

NOTE

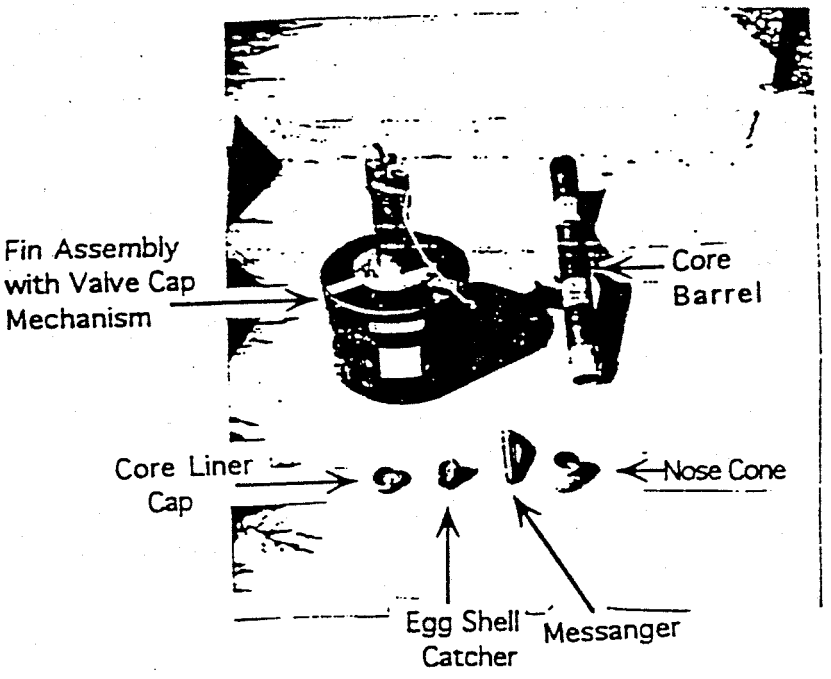
Step 5 is optional and should be used only if the core sample is lost from the corer liner or if coarse material is being cored.

5. Insert the egg-shell catcher into the end of the core liner. The point of the catcher should be pointed toward the fin assembly (up).

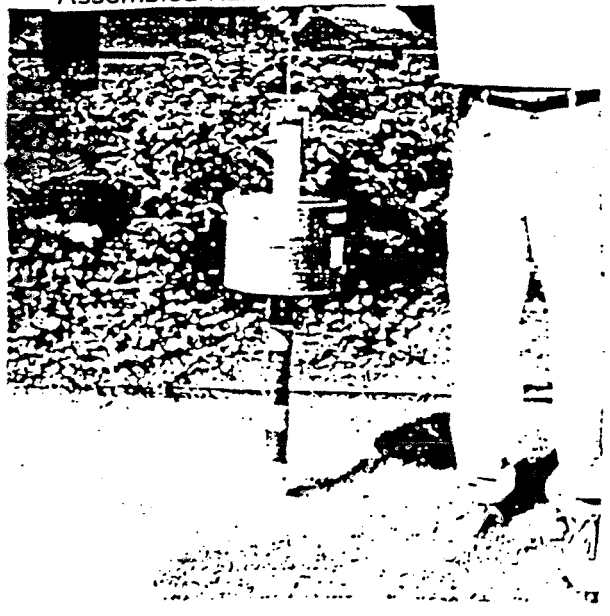
6. Screw the nose cone onto the end of the core barrel and hand tighten.

APPENDIX 4 (Continued)

Hand-held, Gravity Coring Equipment
Figure F

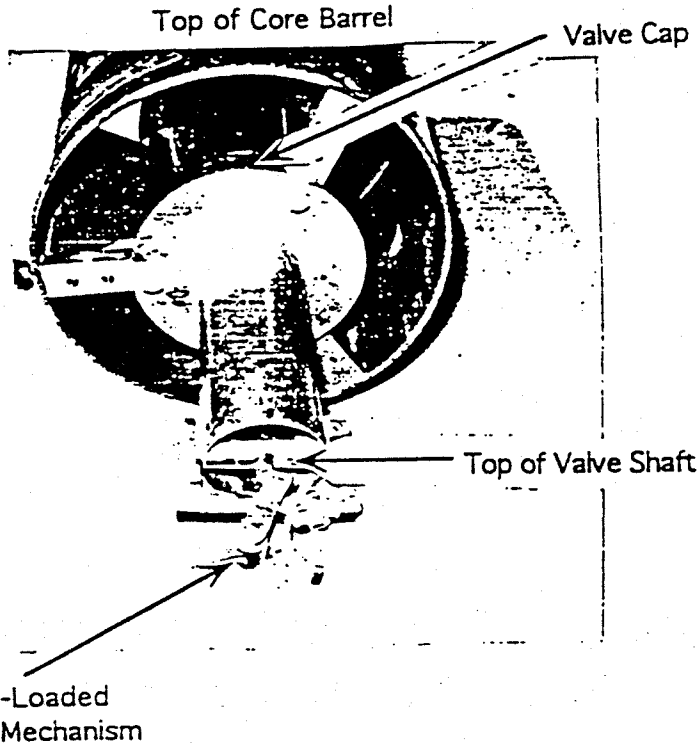


Assembled Hand-Held Corer



APPENDIX 4 (Continued)

Hand-held, Gravity Coring Equipment
Figure G



APPENDIX 5

Sediment Sample Collection Form (SSCF)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT FORM SW.6A

SEDIMENT SAMPLE COLLECTION FORM

SAMPLE ID: _____ SITE ID: _____ LOCATION: _____

NORTH OR Y: _____ EAST OR X: _____

COLLECTION DATE: _____ QUARTER: 1 2 3 4 DRY: Y / N

COLLECTION TIME: _____ PURPOSE: _____

COMPOSITE: Y / N

COMPOSITE DESCRIPTION: _____

QC TYPE: REAL MS MSD LR DUP RNS QC PARTNER: _____

COLLECTION METHOD: Scoop _____ Dredge _____ Core _____ Other _____

SIEVED: Y / N SIEVE SIZE NO: 10

SIEVE MATERIAL: FRAME _____ SCREEN _____

TEAM LEADER _____ TECH _____ TECH _____ TECH _____

VOLUME COLLECTED: _____ UNITS: _____

DEPTH OF WATER: _____ Feet

DEPTH OF TAKE: _____ Inches

COMMENTS: _____

SAMPLED FROM:

Shore Stream Boat Bridge Cross-Section Dry Area Other _____

SAMPLING CONDITIONS:

Stream Pond Dry Other _____

WEATHER:

Clear Calm Hot Sunny P/C Lt. Breeze Warm Fog Cloudy Windy Cool Rain

Gusty Cold Sleet V. Cold Snow Other _____

MATRIX: _____

REQUEST FOR ANALYSIS NO: _____

CHAIN OF CUSTODY NO: _____

SHIP DATE: _____

Sampler: _____

Prepared by: _____
Print Name Signature

Company: _____

(SW.1-440-0101-440)(ST-WIREV.2)(02/26/92)

APPENDIX 6
Eckman Grab Sampler
(From Welch, 1948)

EKMAN DREDGE

Of all the various bottom samplers, the Ekman dredge is so preeminently successful and so widely used for soft bottoms that it has become the standard instrument. In its present form (Fig. 50) it is modified from the original Ekman design by being adapted to the use of a messenger for closing. It is commonly built in two sizes, one having a cross section of 6 × 6 in. (15.2 × 15.2 cm.) and the other 9 × 9 in. (22.8 × 22.8 cm.). The body of the dredge consists of a square or rectangular box of sheet brass. The lower opening of this box is closed by a pair of strong brass jaws so made and installed that they oppose each other and, when shut, close tightly; when fully pulled apart, they leave the whole bottom of the box open. Two strong external springs, when released by the messenger,

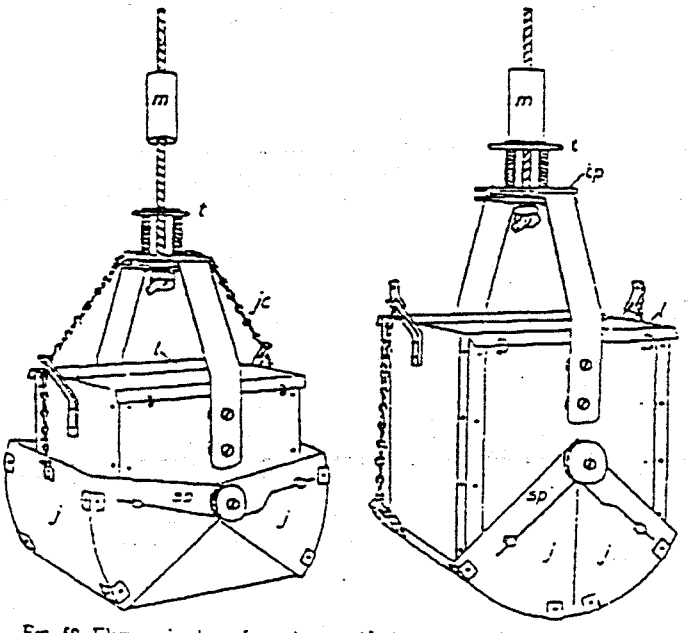


FIG. 50. Ekman dredge of usual type. (*Left*) In open form and ready to be lowered into water. (*Right*) In closed form after messenger has released trip mechanism and jaws have closed. (*j*) Jaw. (*jc*) Jaw chain. (*l*) Top lid. (*m*) Messenger. (*sp*) Spring which operates jaws. (*t*) Trip mechanism. (*tp*) Trip pin.

APPENDIX 6 (continued)
Eckman Grab Sampler
(From Welch, 1948)

snap the jaws shut. The top of the box is closed by two thin, hinged, overlapping lids which open easily when the dredge is descending through the water but which close and are held tightly shut by the water pressure while the dredge is lifted to the surface. A spring mechanism at the top of the sampler provides a means of releasing the jaws by a messenger when the sampler is at the proper place. Two short chains extend from the upper edges of the jaws to two pins in the spring mechanism when the jaws are set at the open position. Other details of construction appear in Fig. 50.

In operation, the sampler is attached to a strong rope by passing the latter through the trip mechanism and knotting it securely below the underlying plate. The sampler is then lowered into the water until it rests on the bottom. Its own weight is usually sufficient to sink it in the mud for much or all of its height. After a short time to allow for settling, the messenger is sent down on the rope causing the jaws to close and bite out a sample. If the sampler is in good condition this sample can be drawn to the surface without loss and without any contact with overlying water. On arrival at the top the sample is delivered into screens, containers or elsewhere by merely pulling up the jaw chains.

This sampler is especially adapted for use in soft, finely divided mud, muck, ooze, submerged marl and fine peaty materials. It will not function on sand bottoms since the springs are not strong enough to force the jaws closed; also fine grains of sand get between the sides of the box and the closely opposed sides of the jaws, preventing the latter from closing. This difficulty may appear even in muds having some intermixture of fine sand. The presence of hard objects (sticks, partly decayed leaves, clams, stones) may cause difficulty by getting between the jaws. Ordinarily the instrument is useless on hard bottoms.

This sampler has been modified in various ways to suit special purposes. For example, it may be made in a tall form in order to provide a better chance of securing the uppermost, fine, bottom materials. Such a tall form is sometimes equipped with a series of regularly spaced, horizontal slits through which thin metal sheets resembling the shutters on a camera plate holder can be inserted thus dividing the sample into horizontal strata which can be delivered one at a time, thus making possible a study of stratification of materials and vertical distribution of organisms. Both the standard and the tall forms are sometimes equipped with a brass screen of selected mesh which covers the upper end of the instrument just below the lids. Such a screen is looked upon by some workers as a means of preventing the overspill loss of organisms and coarser materials by the sampler sinking into the mud deeper than its own height. However, when a sampler is so screened, it must be used with care since if lowered too speedily into a bottom the passage of watery mud through the screen may not equal the speed of lowering and then there is a danger of underspill

APPENDIX 6 (continued
Eckman Grab Sampler
(From Welch, 1948)

at the bottom opening. The size of mesh of such a screen must be selected with care and preliminary tests of a sampler so equipped should be conducted in the laboratory before it is used in the field.

General Considerations

a. All nuts must be sealed into place with solder to prevent loss in the field.

b. In attaching the rope to the sampler, care must be taken to make a close, secure knot below the supporting plate with the rope end worked into the knot, otherwise the loose end may interfere with the closure of the upper lids.

c. When lowering the sampler into the water, it should be started down in a vertical position and then not dropped too rapidly, otherwise the open sampler will tend to descend in some diagonal direction. When lowered properly, the sampler will meet bottom in the correct position.

d. Ekman samplers of larger sizes (9 × 9 in. or larger) when loaded are heavy and ordinarily should be used with the aid of a hoist (Fig. 51).

e. While this sampler, as usually built, is sturdy and will function indefinitely, damage in the form of bent or dented sides, jaws, and lids is likely to result in leaks, seriously impairing its usefulness. Hence in use, impacts with the boat and other objects should be avoided.

f. An Ekman dredge may be used at any depths in inland waters.

g. The Ekman dredge is suitable both for qualitative and quantitative work.

PETERSEN DREDGE

The Petersen dredge is now widely used for taking samples on hard bottoms, such as sand, gravel, marl, clay, and similar materials. This sturdy dredge is usually built of iron and so constructed that both by its own weight and by the leverage exerted by its closing mechanism it bites its way into hard bottoms deep enough to secure satisfactory samples. The principal features of construction appear in Fig. 52. It may be made in any desired size and weight. For ordinary uses one which weighs 35 lb. empty and which may be loaded with weights bolted to the outer surface of the jaws to a total weight of 70 lb. is recommended. Since the total weight is markedly increased when the instrument acquires a sample it is usually necessary to operate it with a hoist (Fig. 51). A dredge of the size just mentioned will enclose an area, when open, of about 0.08 sq. m. The weight of its load depends upon how nearly it fills and upon the character of the bottom materials. One of its virtues is simplicity of construction and operation. Barring accidents, such a dredge will last indefinitely. The tripping device consists only of a horizontal locking bar which holds the

APPENDIX 6 (continued)
Eckman Grab Sampler
(From Edmondson and Winberg, 1971)

2. *Ekman type samplers*

These samplers are metal boxes closed by jaws at the bottom. Because of simplicity and availability, the Ekman grab or variations of it have been very widely-used.

The Ekman grab

The body of the Ekman grab consists of a square or rectangular box of sheet brass usually 25 cm on each side (Fig. 1.3.10; Ekman 1911; Shadin 1960; Schwoerbel 1966). The lower opening is closed by a pair of strong brass jaws that oppose each other and are closed tightly by springs. When fully pulled apart, they leave the whole bottom of the box open. Two strong external springs, when released by messenger, snap the jaws shut. The top of the box is covered by two thin, hinged, overlapping lids which are pushed open when the grab is descending through the water but which close and are held shut by water pressure while the dredge is lifted to the surface. A spring mechanism at the top of the sampler provides a means of releasing the jaws by a messenger when the sampler is on the bottom.

In operation, the sampler is cocked and lowered to the bottom. Its own weight should be sufficient to sink it in the mud for much of its height. The messenger is then sent down on the rope causing the jaws to close. If the sampler has worked properly, it can be drawn to the surface without loss of material or disturbance within. On arrival at the surface, the sample is delivered into containers by merely pulling up the jaw chains (description from Welch 1948).

This grab is specially adapted for use in medium soft deposits. The most important

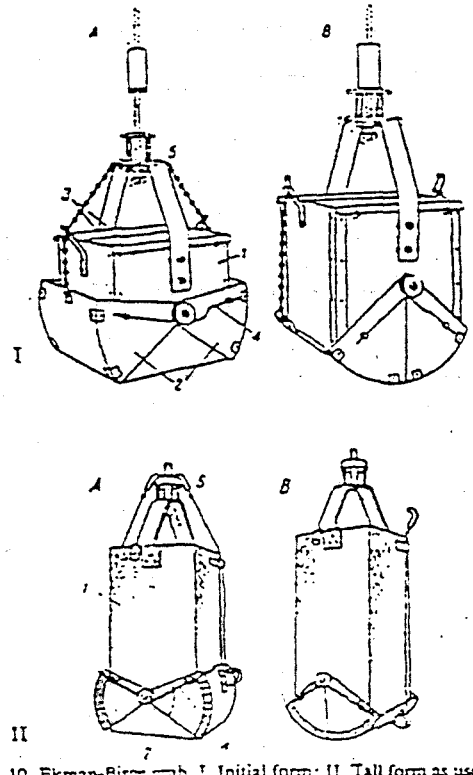


Figure 1.3.10. Ekman-Birge grab. I. Initial form; II. Tall form as used by Borutsky. A, open; B, closed. It is advantageous to use flexible cable rather than chains to hold the jaws open and to have the guides open rather than to have the cable pass through a hole. 1, box; 2, jaws; 3, top lids; 4, spring which operates jaws; 5, jaw chain fastened on trip mechanism. (From Pavlovski & Zadin 1956.)

APPENDIX 6 (continued)
Eckman Grab Sampler
(From Edmondson and Winberg, 1971)

requirements for proper functioning are: the top lids opening easily and strong springs which should tightly close the apparatus when the sample is taken, sufficient weight and height. Too rapid lowering of the grab must be avoided as this causes displacement of ooze even when the lids function properly.

In very soft mud there is a danger of the grab sinking too far into the bottom and losing part of the contents through the top of the apparatus. It is better therefore to use a tall modification (Fig. I.3.10, II; Lenz 1931; Borutsky 1935; Shadin 1960, 1966). Each sample should be checked to see if there is water above the surface of the deposit in the apparatus.

Screens covering the top opening of the apparatus should not be used because even when the apparatus is lowered very slowly, they cause disturbance of deposits. For the same reason the top lids should move up swiftly under the pressure of flow during lowering the grab and drop down when the instrument is on the bottom.

The Ekman grab on a pole is used in shallower environments with harder sediments (Hrbacek *et al.* 1962, see Section I.3.1). The apparatus is pushed to the proper depth with the pole. The operation of the apparatus in such environments where gravel, shells, etc., do not prevent the jaws from closing can be successful. Less troublesome and more reliable in this type of environment is a sampler of the Zabolocki type (Fig. I.3.11) in which the jaws are closed by hand with a lever.

Deevey & Bishop (1942) used a sampler something like an Ekman grab on a pole, but with long levers extending from the jaws. The jaws were closed by pulling ropes attached to the levers.

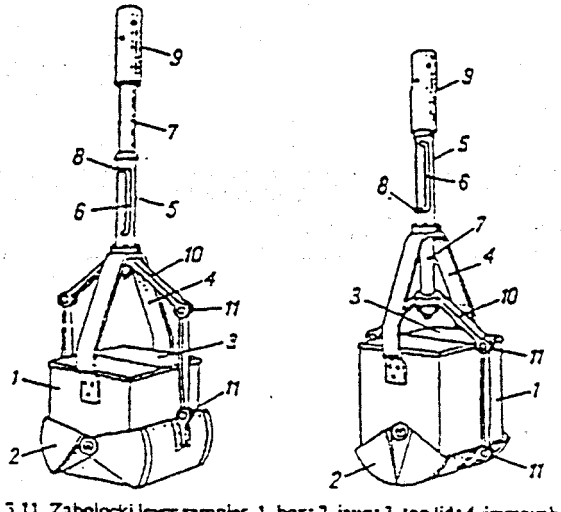


Figure I.3.11. Zabolocki lever sampler. 1, box; 2, jaws; 3, top lid; 4, immovable arch; 5, conducting tube; 6, incision in the tube; 7, pin; 8, peg on a pin; 9, tube on the top of the pin; 10, movable arch; 11, hinges in the middle and at the bottom of movable arch. (From Pavlovski & Shadin 1956.) Note that this is similar to an Ekman grab on a pole, but the jaws are forced to close by pushing down on the pole (see also Fig. I.4.1).

APPENDIX 6 (continued)
Eckman Grab Sampler
(From Edmondson and Winberg, 1971)

Allan's grab (Southwood 1966) works on a similar principle, but should not be advised because of the closed top.

The addition of very strong springs fixed in a suitable way (Hrbacek *et al.* 1962; Wiktor, unpublished) makes the use of the Ekman grab possible even on mud bottom covered with shells (easily crushed by jaws) and on substrates covered with soft vegetation.

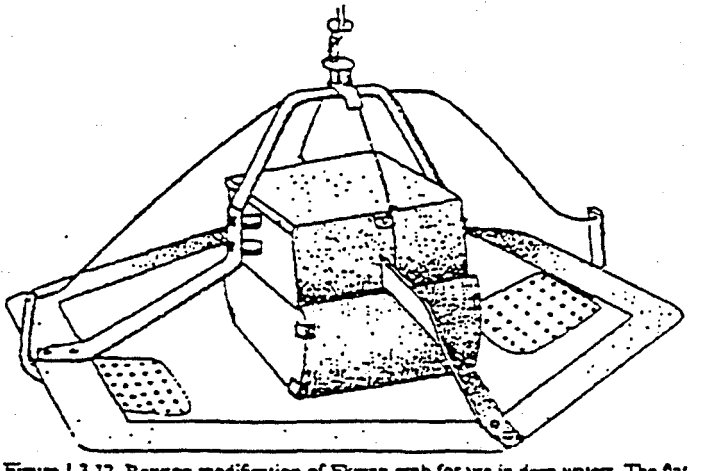


Figure 1.3.12. Rawson modification of Ekman grab for use in deep waters. The flat ring stabilizes the grab and keeps it from falling on its side. The two paddles are pushed up and trip the closing mechanism. Even with messenger activation, the stabilizing ring is useful in deep water.

On bottoms covered with shells only the Ekman grab on a rod can be applied, because even very heavy weights cannot make the grab bite into the substratum Wiktor (unpublished data) used the Ekman grab on a rod even in depths of 8 m, hanging the stick on the mast of the boat and using a block. Samples taken by the Ekman grab from sand, gravel or stony bottom should not be accepted as reliable.

Among other versions of the Ekman grab, Rawson's modification (Fig. 1.3.12; Rawson 1947) should be mentioned. This apparatus can be automatically closed by triggered plates, without the use of a messenger; this saves much time in deep waters and enables the grab to close even when it descends obliquely. Even without the automatic closing feature, the supporting ring is valuable because it prevents the sampler from settling too deeply into the sediment and keep it from tipping over when it is used in deep water (see also Fig. 1.3.13).

APPENDIX 6 (continued)
Eckman Grab Sampler
(From Edmondson and Winberg, 1971)

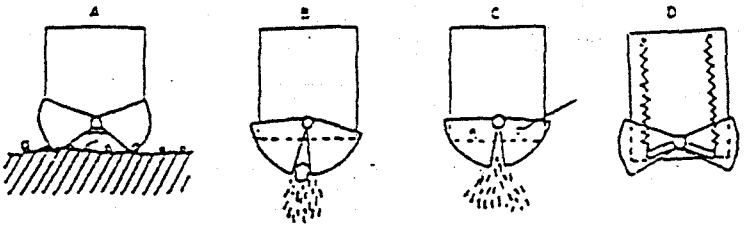


Figure 1.3.13. Possible failures of Ekman grab on coarse bottom materials. a, jaws slide on surface and only superficial material; b, jaws fail to close completely because of stone between them; c, incomplete closure caused by sand stuck between the side pieces of the jaws and the side of the grab; d, modification of springs with pulling on levers to make jaws close with much more force.

Very often additional weights, to assure adequate penetration are used. Auerbach's grab (Auerbach 1953) can be mentioned as an example. As in the Rawson's modification, it closes automatically, which permits sampling in great depths.

Szczepanski's sampler is similar in principle to the Ekman grab but differs in having only one jaw and a smaller sampling surface (10–20 cm^2) (Szczepanski 1953; Shadin 1960, 1966). It can be used on a rope in deep water or on a pole in shallow. It can be used for sampling on much harder bottoms than the Ekman grab.

This and other tall form samplers, when working in deep places, can be supplied with stands or frames to keep them upright as they enter the bottom. This can be very important to successful sampling.

3. *Petersen type samplers*

Some samplers are designed to scrape bottom material into a container during the sampling process.

The Petersen grab consists of two hinged buckets, each forming a sector of a cylinder (Fig. 1.3.14; Welch 1948; Holme 1966; Petersen 1908). It is lowered to the bottom in the open position. When the lowering rope slackens, a release is actuated so that when the grab is hauled two scoops close together and take a bite of sediment semicircular in cross section. This type of grab has been modified in various ways. For example, to increase the closing force, the scoops of the van Veen grab (Holme 1964; Schwoerbel 1966; Wigley 1967) are closed by the pincerlike action of two long arms to which the bridles are attached.

This type of grab operates in such a way that there is uncertainty about the area and the depth sampled. Also, the jaws may be kept partly open by stones or sticks, and part of the sample may be lost. Further, the closed or screened construction of the modified sampler often used creates a pressure wave that can displace the loose surface deposit.

APPENDIX 7
USBM-60 Sampler
(From Guy and Norman, 1982)

finer than about 30 or 40 mm in diameter. As noted in the description of individual samplers, there may also be limitations with respect to some very fine sediments for some of the samplers. The collection and analysis of material larger than coarse gravel logically becomes more difficult and costly because other techniques are required to avoid handling heavy samples with larger and more expensive equipment. Because of the difficulty in measuring large sizes, little information regarding size distribution is available on streams having gravel, cobble, and boulder beds. Therefore, much of the equipment for measurement of large bed material is of an experimental nature, and standard equipment is not available for routine use. Several references are available, however, on direct and indirect methods of sampling and analysis of coarse bed materials. (Lane and Carlson, 1953; Kellerhals, 1967; and Wolman, 1954).

Hand-held samplers—US BMH-53 and US BMH-60

The Federal Inter-Agency Project has developed three types of instruments for sampling the bed material of streams where most of the material is finer than medium gravel. The smallest of the three, designated as the "US BMH-53" (see fig. 8) is designed to sample the bed of wadable streams. The instrument is 46 inches in total length and usually is made of corrosion resistant materials. The collecting end of the sampler is a stainless steel thin-walled cylinder 2 inches in diameter and 5 inches long with a tight-fitting brass piston. The piston is held in position by a rod which passes through the handle to the opposite end. The piston creates a partial vacuum above the material being sampled and thereby compensates in a reverse direction for some of the frictional resistance required to push the sampler into the bed. This partial vacuum also retains the sample in the cylinder while the sampler is being removed from the bed. The piston also serves to force the sample from the cylinder in a manner that results in a sample column with a minimum of distortion from which material at different depths from the surface may be visualized and subsamples obtained. (See F.I.A.S.P. (1963b, 1966) for more detiled information.)

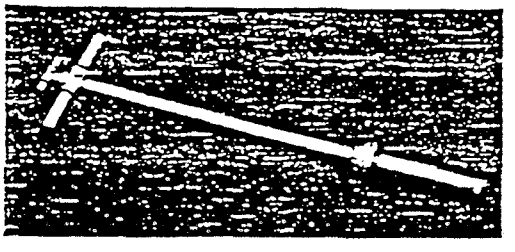


Figure 8.—Hand-held piston-type bed-material sampler, US BMH-53.

The bed material of deeper streams or lakes can be sampled with the US BMH-60. (See fig. 9.) This is a hand-line sampler about 22 inches (56 cm) long, made of cast aluminum, has tail vanes, and is available in weights of 30, 35, or 40 pounds (13.6, 15.9, or 18.2 kg). Because of its light weight, its use should be restricted to streams of moderate depths and velocities and whose bed material is also moderately firm and yet does not contain much gravel.

The sampler mechanism of the US BMH-60 consists of a scoop or bucket driven by a cross-curved constant-torque motor-type spring that rotates the bucket from front to back. The scoop, when activated by release of tension on the hanger rod, can penetrate into the bed about 1.7 inches (4.3 cm) and can hold approximately 175 cc of material. The scoop is aided in penetration of the bed by extra weight in the sampler nose. To cock the bucket into an open position for sampling (that is, retracted into the body, the sampler must first be supported by the hand line; then the bucket can be rotated (back to front) with an allen wrench to an open position.

Figure 9.—Hand-line spring-driven rotary-bucket 30-pound bed-material sampler, US BMH-60. Adapted from F.I.A.S.P. (1963, p. 103).

APPENDIX 7 (Continued)
USBM-60 Sampler
(From Guy and Norman, 1982)

The hanger rod to which the hand line is attracted is grooved so that a safety yoke can be placed in position to maintain tension on the hanger rod assembly. **Caution: At no time should the hand or fingers be placed in the bucket opening, as the bucket may accidentally close with sufficient force to cause permanent injury!** A piece of wood or a brush can be used to remove any material adhering inside the sample bucket. (See F.I.A.S.P. (1963b, 1966) for more detailed information.)

The bucket closes when the safety yoke is removed and tension on the hand line is released as will occur when the sampler comes to rest on the streambed. A gasket on the closure plate prevents trapped material from contamination or being washed from the bucket.

Cable-and-reel sampler—US BM-54

Except for streams with extremely high velocities, the 100-pound cable-and-reel suspended BM-54 sampler (fig. 10) can be used for sampling bed material of streams and lakes of any reasonable depth. The body of the BM-54 is of cast steel. Its physical configuration is nearly identical with the cast aluminum BMH-60, 22 inches (56 cm) long and with tail vanes. Its operation is also similar to the BMH-60 in that it takes a sample when tension on the cable is released as the sampler touches the bed. The sampling mechanism externally looks similar to that of the BMH-60, but its operation is somewhat different.

After 1956, the BM-54 units were equipped with a safety bar which can be rotated over the front or cutting edge of the bucket when cocked into the open position. The bar then keeps the bucket in the open position, even though the catch mechanism operated by tension on the cable is not engaged. These safety bars should be obtained from the F.I.A.S.P. for use on units issued before 1956. Again, please note that even though a safety bar is used, it is necessary to keep one's hands away from the bucket cavity. The power of the bucket is demonstrated by the fact that upon release, it has been observed to lift the 100-pound (45 kg) sampler from a hard surface.

The driving force of the bucket comes not from a constant-torque spring, but rather from

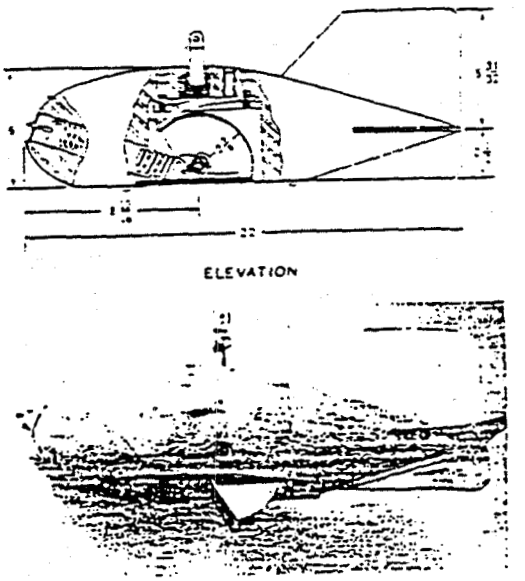


Figure 10.—Elevation sketch (top) and photograph (bottom) of a cable-and-reel spring-driven rotary-bucket 100-pound bed-material sampler, US BM-54. Dimensions on sketch are in inches. Adapted from F.I.A.S.P. (1959, p. 29 and 30).

a conventional coil-type spring. The tension on the spring is adjusted by the nut-and-bolt assembly protruding from the front of the sampler to obtain a bite powerful enough to obtain a sample from the bed of very compacted sand. It is suggested that the tension on the spring be released during extended periods of idleness even though the bucket is closed. Maximum tension need be used only when the streambed is very firm. Unlike the BMH-60, the spring and cable assembly rotates the bucket from the back to the front of the sampler. Again, the trapped sample is kept from washing out by a rubber gasket. (See F.I.A.S.P. (1963b, 1964, and 1966) for more complete description and details.)

In the event that core samples are needed in deep flowing water, a sampler has been developed and extensively used in studies of the Columbia River Estuary by Prych and Hubbell (1966). This cable-suspended sampler collects a 1⅞-inch-diameter by 6-foot-long core by a combination of vibration and an axial force derived by cables from a 250-pound streamlined stabilizing weight.

APPENDIX 8
Generation of Unique Sample Numbers

A datasheet or data form number can be generated by assigning it the number CSDF-XXXXX-III-MMDDYY-KK where,

1. XXXXX is the location number if available (if unavailable or unclear this may be left out),

2. III is your initials,

3. MMDDYY is the date in the indicated format, and

4. KK is a unique number assigned by you, typically the depth of the core section interval in units used in sectioning portion of the CSDF.

EG&G ROCKY FLATS PLANT	Manual Number:	5-21000-OPS
EM OPERATIONS	Procedure No:	SW.28, Rev 0
PROCEDURES MANUAL	Page:	PAGE 1 OF 19
	Effective Date:	9/25/92
CATEGORY 2	Organization:	SWD

TITLE: FIELD LOCATING EFFLUENT PATHWAYS AND DRAINS

Approved By:

George H. Setlock 9/25/92

Director, Environmental Protection — Date

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1. PURPOSE

The purpose of this procedure is to provide instructions for performing a drain and effluent pathway identification inspection as part of the Drain Identification Study (DIS) to ensure that hazardous or otherwise inappropriate substances at Rocky Flats Plant (RFP) cannot inadvertently enter the Sanitary Sewer (SS) system.

2. SCOPE

This procedure implements the requirements of the Drain and Effluent Pathway Assessment Criteria (Appendix 1) established by the Surface Water Division (SWD) of Environmental Management EG&G, RFP.

This procedure addresses inspection of every existing structure at RFP to locate, identify, and document on background layouts and log sheets, all drains and effluent pathways.

3. REFERENCES

3.1 Primary References

3.1.1 DIS Reference Book.

3.1.2 DIS Field Log Book.

3.1.3 Health & Safety Practices Manual, Section 2.08

3.1.4 Rocky Flats Plant Standard SX-164

3.1.5 Training Users Manual 1-10000-TUM

3.2 Secondary References

3.2.1 NPDES FFCA Chromic Acid Incident Plan

3.2.2 Department of Energy (DOE) Orders:

a. DOE Order 5480.4 Environmental Protection, Safety and Health Protection Standards

b. DOE Order 6430.1A General Design Criteria

- Section 1300-8 Special Facilities - Waste Management
- Section 1300-9 Special Facilities - Effluent Control and Monitoring
- Section 1323-5 Special Facilities - Radioactive Liquid Waste Facilities

3.2.3 Environmental Protection Agency (EPA) regulations:

a. 40 CFR 122 National Pollution Discharge Elimination System Permit Regulations

b. 40 CFR 131 Procedures for Approving State Water Quality Standards

3.2.4 Colorado Water Quality Control Act:

a. CRS 35-8 Colorado Water Quality Control Act

b. 5 CCR 1002 - Regulations for the State Discharge Permit System

3.2.5 Conduct of Engineering Manual Section 6.7

3.2.6 Conduct of Engineering Manual DES-19

3.2.7 Conduct of Engineering Manual DES-68A

4. LIMITATIONS AND PRECAUTIONS

None

5. PREREQUISITES

5.1 Personnel shall be current on all training required, per the Training Users Manual, 1-10000-TUM, to perform the tasks described in this procedure.

5.2 Personnel shall be aware of and perform all requirements (i.e., Work Permits, Plan of the Day, appropriate notification, etc.) prior to entering a building or area.

6. INSTRUCTIONS

NOTE

All field investigations shall be performed in accordance with the Drain and Effluent Pathway Assessment Criteria included as Appendix 1.

6.1 Materials

6.1.1 Remove the designated Drain Identification Log Sheets (See Appendix 2), Pathway Identification Log Sheets (See Appendix 3), and corresponding Background Layouts from the **Field Log Book** and replace that section with a sign out sheet (See Appendix 4).

6.1.2 If a sheet of paper with the building number on it has been filed in place of Background Layouts, it means that there were no existing drawings. An inquiry should be made to Engineering Document Control, Building 130, as to whether the building has been entered into the Engineering CAD system. If not it is necessary to sketch that building onto that sheet.

6.1.3 If background layouts are available but are not in the Field Log Book obtain them from Engineering Document Control, Building 130, and include them in the DIS Field Log book.

6.2 Locate Effluent Pathways and Drains

6.2.1 Enter every room in the building or document the justification for not entering the room on the Drain Identification Log Sheets under comments.

6.2.1.1 If a room or building is locked or warning signs require special assistance (e.g., key, Radiation Protection Technologist (RPT) or Security), note the situation on the Drain Identification Log Sheet under comments and retry entry at another time.

6.2.2 Investigate each room for drains and effluent pathways that would allow material to leave or enter the room in the event of a spill.

NOTE

All doorways between rooms are automatically considered an effluent pathway and do not need to be noted unless the doorway is bermed, then the approximate height of the berm is to be recorded under the door openings section of the Pathway Identification Log Sheet and the location reflected on the background layout.

6.2.2.1 Document all drains and effluent pathways in each room on the appropriate log sheet.

6.2.2.2 Document drains and effluent pathways on the Background Layouts with red pen or pencil using appropriate legend symbols (Appendix 5).

NOTE

All unlabeled drains must be noted.

6.2.3 Obtain access to those rooms and buildings that were previously inaccessible (e.g., locked, warning signs, etc.) by enlisting the assistance of the Operations Manager, the Building Manager, an RPT, Security, or any other appropriate source.

NOTE

If a room requires Supplied breathing air, confined space qualifications, or is off limits because of other excessive dangers, then entry need not be pursued. The room shall be considered Potentially Hazardous and Engineering Piping Drawings shall be examined to verify that known documentation does not implicate the SS system with that room.

6.2.3.1 If a room is determined to be inaccessible, note the reason on the Drain Identification Log Sheet under comments.

6.2.3.2 All rooms must be accounted for on the Drain Identification Log Sheets.

6.2.4 Sign and date all marked up Background Layouts and sign the Drain and Pathways Identification Log Sheets.

6.3 Investigate for Discrepancies

6.3.1 Randomly select some of the marked up Background Layouts and compare them to existing Sanitary Sewer or Process Waste (PW) piping drawings for discrepancies.

6.3.2 Field verify all discrepancies and correct the initial findings on the marked up Background Layouts and the Drain and/or the Pathway Identification Log Sheets.

6.4 Review Documents

6.4.1 Review the Drain and Pathways Identification Log Sheets and marked up Background Layouts for consistency of symbols (See Appendix 5) and completeness.

6.4.2 Field verify areas unaccounted for or to clarify documentation if necessary.

6.4.3 Revise or reconstruct log sheets and Background Layouts for consistency of symbols (See Appendix 5) and neatness if necessary.

6.5 Finalize Documents

6.5.1 Ensure that all marked up Background Layouts and the Drain and Pathways Identification Log Sheets have been signed and dated.

6.5.2 Make copies of the Drain and Pathways Identification Log Sheets and Background Layouts.

6.5.3 File the log sheets and marked up Background Layouts under the appropriate section of the DIS Master Log Book and place the copies in the appropriate Field Log Book.

6.5.4 Mark an X under IDEN, on the Status Check List, in the Field Log Book and remove the sign out sheet (See Appendix 4).

7. RECORDS

The log sheets and background layouts are quality records and the originals shall be submitted to the EMD Records Center per 3-21000-ADM-17.01, Quality Records Management, for inclusion in the DIS Master Log Book.

APPENDIX 1
Drain and Effluent Pathway Assessment Criteria

A.1 OBJECTIVE:

Improve source control to reduce the possibility of an inadvertent release of hazardous or otherwise inappropriate substance to the Sanitary Sewer system by:

A.1.1 Ensuring that all drains in a Potential Hazard Area do not feed into the Sanitary Sewer system.

A.1.2 Ensuring that all identified Effluent Pathways within a Potential Hazard Area have been sealed or impeded.

A.1.3 Ensuring that all Restricted Drains are adequately Protected.

A.1.4 Ensuring that all drains dye tested in a NO Potential Hazard areas are labeled in accordance with the determined disposition ("SANITARY SEWER" or PROCESS WASTE).

A.1.5 Ensuring that all drains not dye tested in a NO Potential Hazard Area are labeled "UNDETERMINED - Treat as Sanitary".

A.1.6 Ensuring that all existing drain labels are visible and in good repair at the time of the Drain Identification Study (DIS) inspection.

A.1.7 Ensuring that all new drain label installations generated by the DIS inspection and findings are per the RFP Standard SX-164.

A.1.8 Ensuring that Foundation/Footing drains exposed to a Potential Hazard Area do not feed into the Sanitary Sewer system.

Appendix 1 (Continued)
Drain and Effluent Pathway Assessment Criteria

A.2 CRITERIA 1 (Drain and Effluent Pathway Assessment)

Existing data sources shall be examined and each room in each building shall be walked through documenting drains and effluent pathway locations, Chemicals of Concern, and drain labeling integrity.

NOTE
Work has already been performed by the Resumption Team #6 on sections of Buildings 371, 707, 771, 776, 777 and 779. All previous documentation and findings shall be reviewed and included in the documentation. Any work not complying with current DIS procedures, and the Drain and Effluent Pathway Assessment Criteria, shall be incorporated into this study.

8

Labeled Process Waste drain in a Potential Hazard Area: The drain shall be dye tested using the approved RFP Dye Test procedure. The location and condition of the labels shall be examined and drains relabeled as necessary per the RFP Standard SX-164. If the drain is determined to be connected to the Sanitary Sewer system, then the drain shall be treated the same as "Labeled Sanitary Sewer in a Potential Hazard Area".

Unlabeled drain in a Potential Hazard Area: The drain shall be dye tested using the RFP Dye Test procedure to determine it's disposition and the appropriate action "Label Process Waste or treat the same as "Labeled Sanitary Sewer in a Potential Hazard Area".

Labeled Sanitary Sewer drain in a Potential Hazard Area: The drain shall be Locked Out and Tagged Out (LO/TO) and a corrective action initiated to have a radiological survey performed and permanently remove the drain from service or receive approval from SWD to take the necessary actions to convert it to a Restricted Drain.

Appendix 1 (Continued)
Drain and Effluent Pathway Assessment Criteria

Effluent Pathways in a Potential Hazard Area: Appropriate action shall be initiated to contain the Potential Hazard Area (Cracks shall be filled, penetrations shall be sealed, barriers shall be installed, etc. as required).

Labeled Process Waste drain in a NO Potential Hazard Area: The location and condition of labels shall be examined and drains relabeled per RFP Standard SX-164 as necessary.

Unlabeled drain in a NO Potential Hazard Area: Drain shall be dye tested, existing engineering drawings may be investigated to determine the labeling, or the drain shall be labeled "Undetermined, TREAT AS SANITARY" per RFP Standard SX-164.

Labeled Sanitary Sewer drain in a NO Potential Hazard Area: Drain shall be dye tested, existing engineering drawings may be investigated to confirm the labeling, or the drain shall be relabeled "Undetermined, TREAT AS SANITARY" per the RFP Standard SX-164.

Effluent Pathway in a NO Potential Hazard Area: No action shall be required.

A.3 CRITERIA 2 (Potential Hazard Area Assessment)

A Hazard Assessment (HA) shall be performed on each building to establish Potential Hazard Area boundaries by walking through the buildings examining each room for Chemicals of Concern (COC) and by tracking the source and purpose of each chemical location.

Potential Hazard Area: A room or area which contains or has access to any chemicals of concern exceeding the established SWD Limit or has a combination of chemicals deemed potentially hazardous by SWD in any quantity. All radiation control areas are to be considered Potential Hazard Areas.

Appendix 1 (Continued)
Drain and Effluent Pathway Assessment Criteria

NO Potential Hazard Area: An area which does not meet the definition of a Potential Hazard Area (eg; offices, restrooms and janitor closets located outside radiation control areas and without access to COC).

Restricted Drain: A Sanitary Sewer drain which remains in a Potential Hazard Area with the approval and application of specific restrictions by SWD. Restrictions may include the following:

The drain must remain locked out and sealed against inadvertent discharge except for approved restricted use.

Warnings signs must be posted.

A current list of materials not suitable for discharge into the drain, shall be posted or remain accessible at all times to the approved users of the drain. This list shall be provided originally to the Operations Manager by SWD.

The approved users of the drain shall be trained in the appropriate use of the drain.

APPENDIX 2
Drain Identification Log Sheet

DRAIN IDENTIFICATION LOG SHEET

BUILDING #_____

ROOM #	NO DRAINS	SINKS			FLOOR DR			SUMPS			COMMENTS
		SS	PW	U/L	SS	PW	U/L	SS	PW	U/L	

INSPECTED BY:_____ Signed_____ Dated_____

INSPECTED BY:_____ Signed_____ Dated_____

* Doorways without thresholds are assumed. Do not note.

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APPENDIX 3
Pathway Identification Log Sheet

PATHWAY IDENTIFICATION LOG SHEET

BUILDING #_____

ROOM #	DOOR OPENINGS	FLOOR PENETRATION	CRACKS IN FLOOR	TRENCHES & PITS	COMMENTS

INSPECTED BY:_____

Signed _____ Dated _____

INSPECTED BY:_____

Signed _____ Dated _____

APPENDIX 4
Signout Sheet

FIELD LOG BOOK

SIGN OUT SHEET

Name_____

Date_____

Building_____

Log Sheets_____

Drawings_____

APPENDIX 5
Symbols, Terms & Definitions

Symbols

DRAWING AND LOG SHEET
SYMBOL LEGEND

SYMBOL	
SS	Sanitary Sewer Drain
PW	Process Waste Drain
FD	Floor Drain
SH	Shower Drain
SU	Sump
TR	Trench
UT	Utinlity Trench
U/L	Unlabeled Drain
WWA	Wet Work Area
o	Approx. Drain location
	Secondary Containment

APPENDIX 5 (Continued)
Symbols, Terms & Definitions

TERMS & DEFINITIONS

Chemicals of Concern (COC) - Toxic chemicals, hazardous chemicals, bases, oils, solvents, paints, radioactive and waste materials, PCBs, etc. in liquid or fine solid form. COC are identified by SWD and used to define Areas Potential Hazardous to surface waters.

DIS Field Log Books - Each book represents a group of buildings categorized according to priority. Each book contains; an area map; a list of buildings in each group; log sheets and background layouts. These items constitute the field work sheets. When a drawing of a building could not be located, a blank sheet of paper with the building number on it has been placed in the book.

DIS MASTER Log Book - PROJECT DATA MANUAL. The DIS Master Log Book shall, upon completion of the DIS project, contain the Building Group Lists, Status Check List, Flow charts, Procedures, Health & Safety (H&S) Plan, Chemicals of Concern List, Calculation sheets (where applicable), Drain and Pathway Identification Log Sheets, Background layouts, Dye Test Log Sheets, Dye Sighting (DS) Log Sheets, and Corrective Action Lists.

DIS Reference Book - A collection of reference data including contact lists, procedures, forms, standards, action plans, schedules information, and resumption findings for use in performing DIS field evaluations.

Drain - Any drain location above or below floor level (floor drain, sink, shower, sump, wet work area, etc.) that provides access to the Sanitary Sewer or the Process Waste systems.

Note:
The <u>only</u> drains of no concern are toilets, drinking fountains, dishwashers, ice makers, and hand basins in a <u>confirmed</u> NO Potential Hazard Area, and approved equipment directly plumbed into a SS or PW system.

APPENDIX 5 (Continued)
Symbols, Terms & Definitions

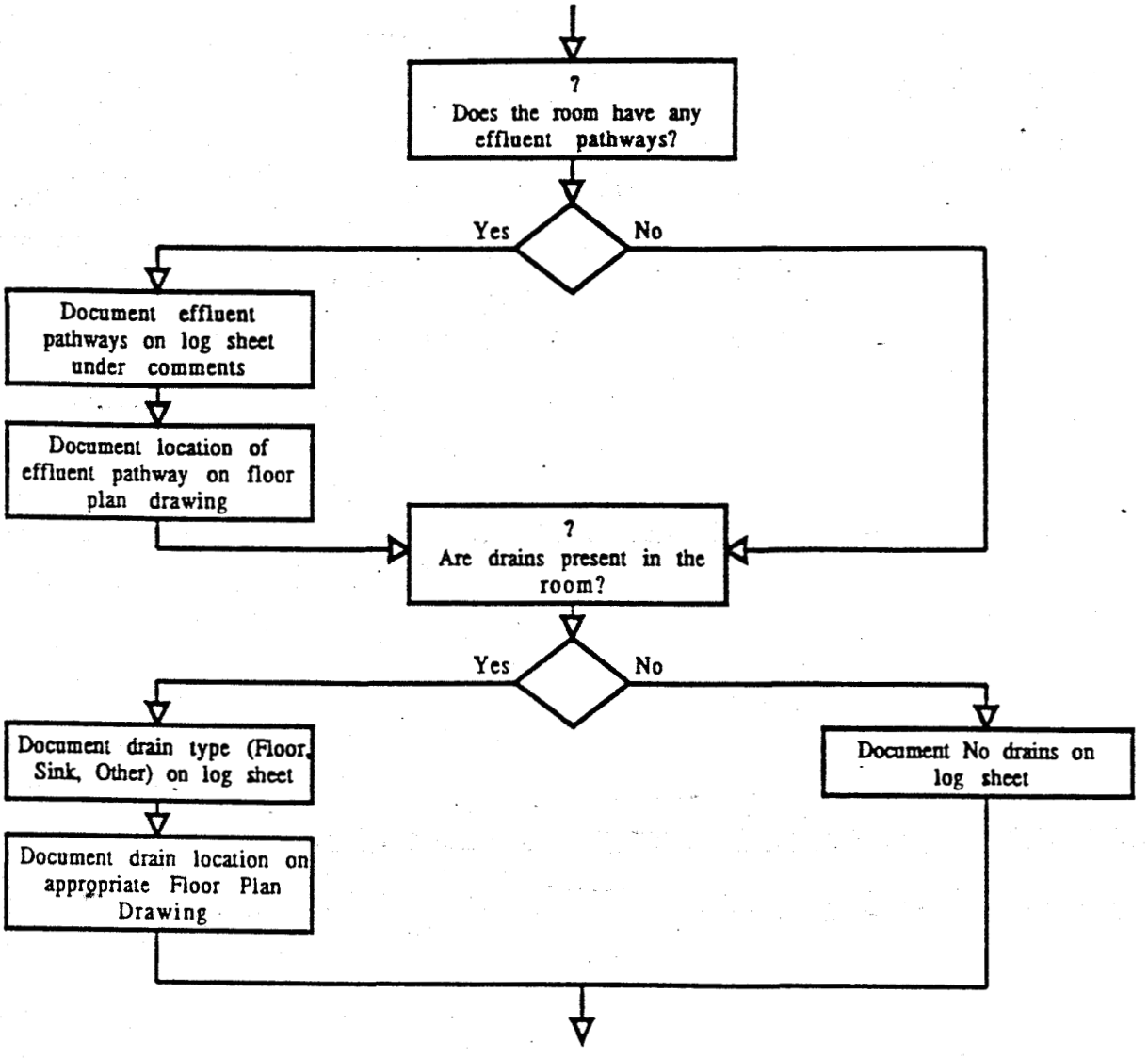
Effluent Pathways - Any labeled or unlabeled access to the Sanitary Sewer, Process Waste, or Foundation Drain Systems (e.g., All trenches, floor penetrations, cracks, pipe runs, expansion joints, etc.).

Foundation Footing Drain - A pipe or series of pipes which collect and discharges ground water from the foundation footing of a structure.

LO/TO - Lock out, Tag out - A temporary measure to deter use of a drain until the drain can be permanently removed. This Provides a physical barrier (not necessarily permanent) to prevent the use of the drain designated by a red tag affixed to the drain (per Health & Safety Practices Manual 2.06).

Remove Drain - Permanently remove drain from service. This can be accomplished by the plugging of the drain with concrete, installing a permanently sealed cover or cap, or removing the drain pipe, etc.

APPENDIX 6
Flow Chart



FIELD LOCATE EFFLUENT PATHWAYS AND DRAINS
ACTIVITY FLOW CHART

Issue date: 03-06-92

EG&G ROCKY FLATS PLANT	Manual Number:	5-21000-OPS
EM OPERATIONS	Procedure No:	SW.29, Rev 0
PROCEDURES MANUAL	Page:	PAGE 1 OF 24
	Effective Date:	9/29/92
CATEGORY 2	Organization:	SWD

TITLE:
DYE TESTING
BUILDING DRAINS

Approved By:

George H. Setlock 9/29/92
for Manager, Surface Water Division Date

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1. PURPOSE

The purpose of this procedure is to provide instructions for Dye Testing building drains at the Rocky Flats Plant (RFP) to ensure that unacceptable amounts of hazardous or otherwise inappropriate substances at Rocky Flats Plant (RFP) cannot inadvertently enter the Sanitary Sewer (SS) system.

2. SCOPE

This procedure implements Dye Testing and documentation of any drain at RFP to ensure the drain's integrity or to determine the drains true disposition.

This procedure addresses the visual detection of dye at selected manholes, the Diversion Boxes and at Process Waste sampling locations when appropriate.

3. REFERENCES

3.1 Primary References

3.1.1 Dye Testing Health and Safety Plan

3.1.2 RFP Engineering Document Control Facilities Engineering Drawings

3.1.3 RFP Standard SX-164

3.1.4 RFP Training Users Manual 1-10000-TUM

3.1.5 RFP LO/TO Procedure (Health & Safety Practices, Section 2.08)

3.1.6 RFP EM/SWD 3-21000-ADM-17.01, QA Records Management.

3.2 Secondary References

3.2.1 NPDES FFCA Chromic Acid Incident plan

3.2.2 DEPARTMENT OF ENERGY (DOE) ORDERS:

a. DOE Order 5480.4 Environmental Protection, Safety and Health Protection Standards

b. DOE Order 6430.1A General Design Criteria

- Section 1300-8 Special Facilities - Waste Management
- Section 1300-9 Special Facilities - Effluent Control and Monitoring
- Section 1323-5 Special Facilities - Radioactive Liquid Waste Facilities

3.2.3 ENVIRONMENTAL PROTECTION AGENCY (EPA) REGULATIONS:

a. 40 CFR 122 National Pollution Discharge Elimination System Permit Regulations

b. 40 CFR 131 Procedures for Approving State Water Quality Standards

3.2.4 COLORADO WATER QUALITY CONTROL ACT:

a. CRS 35-8 Colorado Water Quality Control Act

b. 5 CCR 1002 - Regulations for the State discharge Permit System

3.2.5 Conduct of Engineering Manual Section 6.7

3.2.6 Conduct of Engineering Manual DES-19

3.2.7 Conduct of Engineering Manual DES-68A

4. LIMITATIONS AND PRECAUTIONS

4.1 Personnel in the vicinity of an open manhole or 990 Diversion Boxes shall consider the potential hazards (e.g., confined space entries, rising water, falls) and not put themselves or others at undue risk.

5. PREREQUISITES

5.1 Personnel shall read and understand the Dye Testing Health and Safety plan.

5.2 Personnel shall be current on all training required, per the Training Users Manual, 1-10000-TUM, to perform the tasks described in this procedure.

5.3 Personnel shall be aware of and perform all requirements (i.e., Work Permits, Plan of the Day, appropriate notification, etc.) prior to entering a building or area.

6. INSTRUCTIONS

6.1 Preparation

6.1.1 Obtain copies of Engineering Reference Drawings (Floor Plans, Site Utilities Plans, Plumbing, Process Waste & Sanitary Sewer drawings) from Engineering Document Control (building 130), the building representative, or other sources.

6.1.2 Obtain access to copies of the SWD approved "Baseline" time for the building (if established).

6.1.3 Using the copies of the Reference Drawings, determine the location of the drain(s) to be dye tested, the location of the exit point of the Sanitary Sewer Main from the building, and a known SS drain (Toilet,etc.) furthest from that exit point.

6.1.4 Using the Sight Utilities Plan and the Manhole Location Map (Appendix 10), identify the down gradient sanitary manhole (if any), associated with the building being dye tested, and/or verify the location in the field.

6.1.5 Field walk down the area to verify determinations.

6.1.6 Obtain the Dye Test Ready Review Sheet (Appendix 4) from RFP Forms Control, and complete the tasks on the form including the appropriate notifications.

6.1.7 Complete the Dye Test Ready Review Sheet (Appendix 3) including the appropriate notifications.

6.1.8 Obtain Dye Test Log Sheet (Appendix 2) and Dye Sighting (DS) Log Sheet (Appendix 3) forms from RFP Forms Control.

6.1.9 Arrange for a Process Waste representative to sample the PW waters at an appropriate Sampling Port, (if a port exists on that system) when Dye Testing Unlabeled or Questionable drains.

6.1.10 Obtain materials listed in Appendix 5.

6.1.11 Take appropriate actions to gain access to the building to be dye tested and the dye sighting areas.

6.1.12 Establish a source of water and the most reasonable method of transportation (e.g., hose, bucket, etc) available to transport water to the dye injection sites.

6.1.13 Station Dye Spotters at the Sanitary Sewer down gradient manhole and/or at the 990 Diversion Box to visually inspect the sanitary waste water for color changes indicating the presence of dye.

6.1.14 If an SWD approved "Baseline" time does not exist, then establish a "Baseline" time for the building as instructed in Section 6.2.

6.2 Establish a "Baseline" Time

6.2.1 Using information gathered in Section 6.1.1, locate a known SS drain (Toilet, sink, etc.) furthest from the main drain lines exit point from the building.

6.2.2 Mix one tablespoon of FD&C red dye 40 with 5 gallons of water until all granules have dissolved (Dye Concentrate).

6.2.3 Inject dye into drain(s) as follows:

6.2.3.1 For toilets

a. Dispense 1 tablespoon of FD&C red dye 40 into the toilet(s).

b. Flush toilet at least 5 times ensuring that all dry granules are flushed into and down the drain with the water.

6.2.3.2 For building drains (sinks, floor drains, etc.)

a. Pour 1 to 2 pints of concentrate into a drain.

b. Flush with a minimum of 20 gallons of water.

6.2.4 Document the time of dye injection on the Dye Test Log Sheet and alert the Dye Spotters, by radio, to start watching for dye traces at the Dye Sighting locations (See Section 6.5).

6.2.5 After receiving notification from the Dye Spotter(s) that dye has been detected, document the time(s) and location(s) on the Dye Test Log Sheet.

6.2.6 Note the total time it took for dye to reach each location on the Dye Test Log Sheet under comments.

NOTE

This duration becomes the suggested "baseline" for flow to go from the building to the SS dye spotting locations. The baseline is only a guideline. Experienced judgement shall be required in making determinations based on this factor.

6.2.7 Allow at least twice the "baseline" time to pass before injecting dye into the next drain, or series of drains.

6.3 Dye Testing Labeled Process Waste Drain

6.3.1 Establish a "Baseline" time for the building as instructed in Section 6.2 or use an SWD approved previously established "Baseline" time.

6.3.2 Mix one tablespoon of FD&C red dye 40 with 5 gallons of water until all granules have dissolved (Dye Concentrate) as needed.

6.3.3 Inject dye into one or more PW drains, as directed in Section 6.2.3.

6.3.4 Document the time of dye injection on the Dye Test Log Sheet and alert the Dye Spotters, by radio, to start watching for dye traces at the Dye Sighting locations (See Section 6.5).

6.3.5 After receiving notification from the Dye Spotter(s) that dye has been detected, document the time(s) and location(s) on the Dye Test Log Sheet.

a. If no dye is detected at the SS Dye Spotting locations within the "baseline" time then document the disposition of each drain on the Dye Test Log Sheet as PW.

b. If dye does appear at a Sanitary Sewer location, one or more of the labeled Process drains are mislabeled. Drains must be re-dye tested, one at a time, until all improperly labeled drains are detected.

NOTE

After injecting dye into the final labeled Process Waste drain in a building, allow the dye at least twice the "baseline" time to reach one of the officially designated dye sighting location(s) before Dye Testing an Unlabeled drain or before Dye Testing in another building.

6.3.6 Sign all Dye Test Log Sheets, at the end of each day, then deliver them to the EM/SWD DIS Master Log Book representative.

6.4 Dye Testing Unlabeled or Questionable Drains

6.4.1 Establish a "Baseline" time for the building as instructed in Section 6.2 or use an SWD approved previously established "Baseline" time.

6.4.2 Station a Process Waste representative at the appropriate PW sampling port. This would be in conjunction with the SS Dye Spotting locations set up when the "baseline" time was established and inject dye (as instructed in Step ?) into one or more Unlabeled or Questionable drains.

NOTE

If a PW representative could not be stationed at a sampling port, then Questionable drains must be dye tested one at a time. If a PW representative is located at a PW location and dye is detected at both SS and PW Dye Sighting locations, then drains must be re-tested one at a time.

6.4.3 Mix one tablespoon of FD&C red dye 40 with 5 gallons of water until all granules have dissolved (Dye Concentrate) as needed.

6.4.4 Inject dye into one Unlabeled or Questionable drains at a time, as directed in Section 6.2.3.

6.4.5 Document the time of dye injection on the Dye Test Log Sheet and alert the Dye Spotters, by radio, to start watching for dye traces at the Dye Sighting locations (See Section 6.5).

6.4.6 Document the time and location of any dye sightings on the Dye Test Log Sheet after receiving notification from Dye Spotter(s).

a. If dye is detected at any of the SS Dye Spotting locations then document the disposition of that drain on the Dye Test Log Sheet as SS.

b. If dye is detected at the PW Dye Sampling location(s) then document the disposition of that drain on the Dye Test Log Sheet as PW.

c. If dye does not appear at any Dye Spotting or Dye Sampling location then, the drain must be treated as SS until verified and approved evidence can be presented to the contrary.

6.4.7 Allow the "baseline" time to pass before injecting dye into the next drain.

NOTE

After injecting dye into the final Unlabeled drain in a building allow at least twice the "baseline" time for the dye to reach one of the official dye sighting locations before Dye Testing any Process Waste drains or before Dye Testing in another building discharging to the same Sanitary Sewer manhole or Process Waste System.

6.4.8 Sign all Dye Test Log Sheets, at the end of each day.

6.5 Dye Sighting

NOTE

The Dye Injector shall send notification, by radio, to all Dye Spotters at the time the dye is injected. If a color, other than red, should appear at the Sanitary Sewer while dye testing a drain or a series of drains, then all discharging to the SS system is to be discontinued for two (2) hours and that drain is to be re-dye tested or, the drain is to be treated as Sanitary Sewer.

6.5.1 Process Waste Locations

NOTE

All Process Waste Dye Spotters (Samplers) and Sampling Port Locations (e.g., a pit, a sump, etc.) shall be specified by Liquid Waste Operations Management.

6.5.1.1 Draw water from the Sampling Valve and visually inspect for color prior to dye injection.

6.5.1.2 Close the main valve entering the appropriate Process Waste tank immediately upon receiving notification that the dye has been injected into a drain.

6.5.1.3 Draw water from the Sampling Valve 10 minutes after the dye injection; compare the color to the previous sample; and visually inspect for dye; open valve.

6.5.1.4 Notify the Dye Injector by radio of visual color changes.

6.5.1.5 Document the date, time and location of each sample taken, on a DS Log Sheet.

6.5.1.6 Repeat Sections 6.5.1.1 through 6.5.1.5 for each dye injection.

6.5.1.7 Sign all DS Log Sheets, at the end of each day.

6.5.2 Manholes

Read and understand the Dye Test H&S Plan.

NOTE

The Dye Injector shall send notification, by radio, at the time dye has been introduced into the system.

WARNING

DO NOT ENTER THE MANHOLE AND USE EXTREME CAUTION WHEN REMOVING THE MANHOLE COVER!

6.5.2.1 Remove the cover on each manhole and test for gasses, following the Health & Safety Plan.

6.5.2.2 Stand above the manhole and lower the "Backdrop Extension" (See Appendix 4) down into the manhole. Shine a high intensity light down on it after receiving notification that dye has been injected into the system.

6.5.2.3 Watch for any dye traces in the water crossing over the backdrop.

6.5.2.4 Notify the Dye Injector and the spotter at the Diversion Box by radio immediately upon sighting dye.

6.5.2.5 Document the date, time and location of each sighting on a DS Log Sheet.

6.5.2.6 Repeat Sections 6.5.2.2 through 6.5.2.5 for each required dye sighting at that location.

6.5.2.7 Sign all DS Log Sheets, at the end of each day.

6.5.3 990 Diversion Box

NOTE

The Dye Injector shall send notification, by radio, at the time dye has been introduced into the system.

WARNING

DO NOT ENTER THE MANHOLE AND USE EXTREME CAUTION WHEN REMOVING THE GRILLE ON THE DIVERSION BOX!

6.5.3.1 Stand above the Diversion Box on the fall side.

6.5.3.2 Lower the "Backdrop Extension" (See appendix 4) down into the Diversion Box and shine a high intensity light down on the backdrop plate and watch for dye to appear in the stream of water crossing over it upon receiving notification from the Dye Injector that dye has been introduced into the system.

6.5.3.3 Notify the Dye Injector by radio immediately upon sighting dye.

NOTE

The Dye Spotter at the manhole upstream from the Diversion Box shall send notification, by radio, if dye is spotted at that location first.

6.5.3.4 Document the date, time and location of each sighting, on the DS Log Sheet.

6.5.3.5 Repeat Sections 6.5.3.1 through 6.5.3.4 for each required dye sighting at that location.

6.5.3.6 Sign all DS Log Sheets, at the end of each day.

6.6 Review Documents

6.6.1 Review the Dye Test and DS Log Sheets for consistency and completeness.

6.6.2 Revise or reconstruct the Dye Test and Dye Sighting Log Sheets for consistency and neatness.

6.7 Finalize Documents

6.7.1 Sign and date all Dye Test and DS Log Sheets.

6.7.2 Send log sheets to RFP EMD Records Center to be filed under the appropriate section of the DIS Master Log Book.

7. RECORDS

The log sheets are quality records and the originals shall be submitted to the EMD Records Center per 3-21000-ADM-17.01, Quality Records Management, for inclusion in the DIS Master Log Book.

APPENDIX 1
Dye Test Log Sheet

BUILDING #_____

ROOM #	RISK AREA	TEST DATE	DRAIN TYPE	INJEC TIME	VERIF TIME	RESULTS SS / PW	COMMENTS/RECOMMENDATION
	N/A		*TEST				

* This known sanitary drain was tested to establish the time required for the tracer dye to enter the diversion box at building 990.

DYE TESTED BY:_____ WITNESSED BY:_____

Signed Dated Signed Dated

APPENDIX 2
Dye Sighting (DS) Log Sheet

DYE SIGHTING LOG SHEET
(DS)

Date:_____

Location:_____

Dye Spotter:_____
(please print name)

TIME NOTIFIED	TIME OF SIGHTING	COMMENTS

_____
(signature)

APPENDIX 3
Dye Test Ready Review Sheet and Contact List

DYE TEST
READY REVIEW SHEET

BUILDING#_____

SECURITY CLEARANCE REQUIRED	YES	NO	
TRAINING REQUIREMENTS COMPLETE	YES	NO	
ON PLAN OF THE DAY	YES	NO	NOT REQ
WORK PERMIT	YES	NO	NOT REQ

CONTACT LIST

Contact each group or individual giving them:

24 Hours Notice & 1 Hour Notice

	EXT	PAGE	DATE
BUILDING OPERATIONS MANAGER	X_____	D_____	_____
BUILDING H&S AREA ENGINEER	X_____	D_____	_____
BUILDING LO/TO MANAGER	X_____	D_____	_____
PLANT PROTECTION	X2464		_____
WALKIE-TALKIE (to get walkie-talkies)	X6429		_____
RCRA/CERCLA - ALLEN SHUBERT	X5251	D1177	_____
WASTE WATER TREATMENT PLANT (WWTP) - FRANK HUFFMAN	X4502	D3112	_____
WASTE OPERATIONS MANAGER - BOB MORGAN	X6013	D1855	_____
SURFACE WATER DIVISION (SWD) - BOB FIEHWEG	X8542	D3132	_____

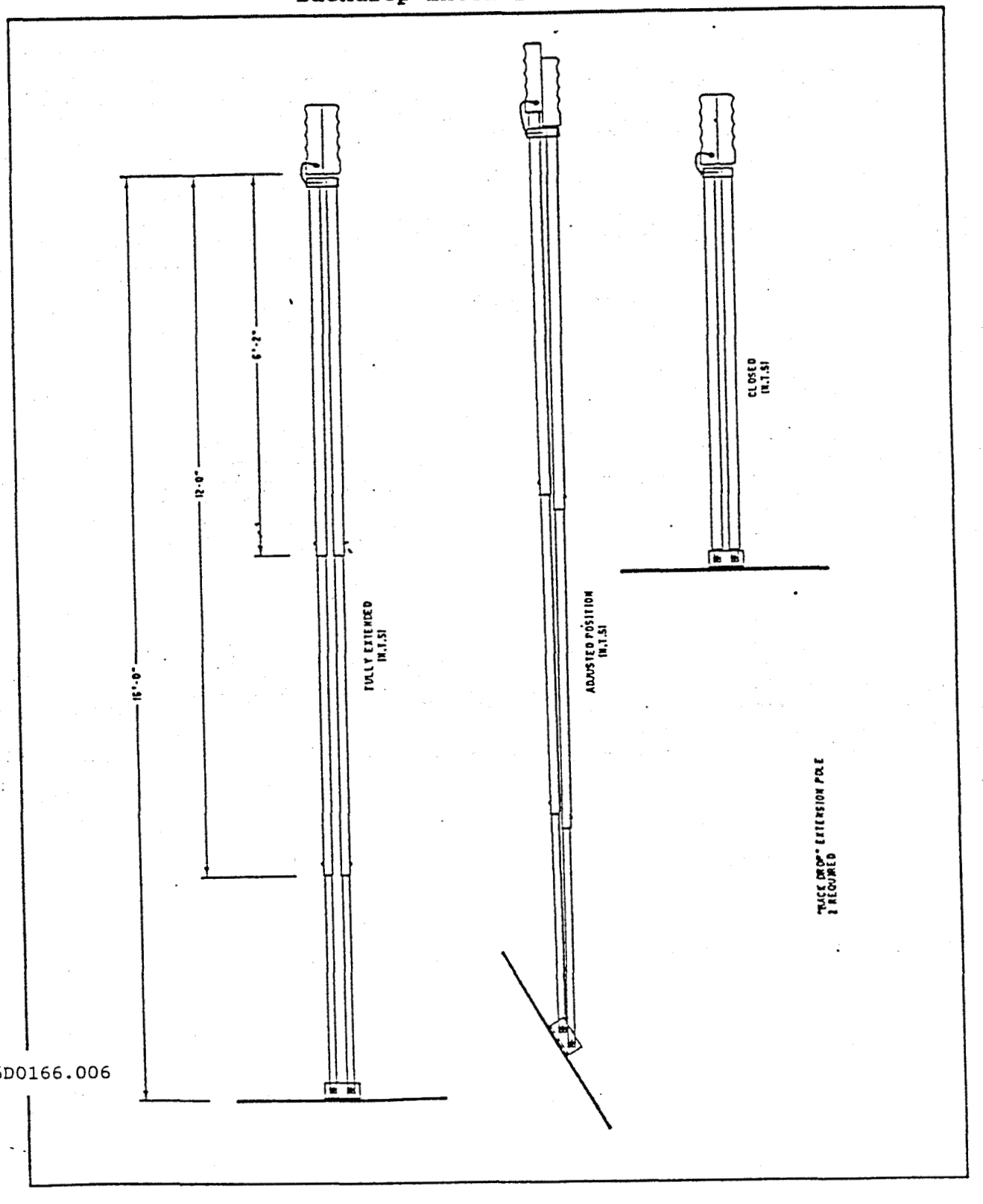
APPENDIX 4
Work Materials List

WORK MATERIALS

Prior to Dye Testing, the following items must be obtained:

- Dye Test Ready Review Sheet and Contact List
- Engineering Sewer Drawings (copies)
- Drain Location Sketch(s) (copies)
- FD&C Red #40 dye and a one tablespoon measuring devise.
- Water supply must be located
- 5 gallon bucket
- 1 gallon container
- Ready made drain covers
- Four Radios set at the same frequency and approved by Security
- High-power flashlight
- Dye Test Log Sheets
- Dye Sighting (DS) Log Sheets
- Writing Surface (Clipboard)
- Writing Instruments
- Protective Clothing (Coveralls, latex gloves, etc.)
- HNu or OVA Meter
- LEL/O_2 Meter
- Backdrop Extension (may be checked out from Surface Water Division of Environmental Management)

APPENDIX 5
Backdrop Extension



APPENDIX 6
Tracer Dye Material Safety Data Sheet (MSDS)
and Engineering Letter of Approval

ROBERT KOCH INDUSTRIES INC.

ROUTE 1, BOX 4HH BENNETT, CO 80102 (303) 644-3763

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: FD&C Red #40 Color Index no: 16035

CHEMICAL NATURE: Food Red 17

% ACTIVITY: 90 - 93%

- 1. PHYSICAL DATA -

BOILING POINT, 760 mm Hg	N/A	FREEZE POINT	N/A
SPECIFIC GRAVITY	N/A	VAPOR PRESSURE AT 20°C	N/A
VAPOR DENSITY	N/A	SOLUBILITY IN H_2O	Approx 25%
PER CENT VOLATILES BY WEIGHT	N/A	IONIC NATURE	N/A
APPEARANCE AND ODOR	Red Granular - Odor none		

- 2. HAZARDOUS INGREDIENTS -

MATERIAL	%	TLV (Units)
FD&C colors are not hazardous material - so not fall under the jurisdiction of D.O.T.		

- 3. FIRE AND EXPLOSION HAZARD DATA -

FLASH POINT (test method)	N/A	AUTOIGNITION TEMPERATURE		N/A
FLAMMABLE LIMITS IN AIR, % by volume	LOWER N/A		UPPER	N/A
EXTINGUISHING MEDIA	Will not burn			
SPECIAL FIRE FIGHTING PROCEDURES	None			
UNUSAL FIRE AND EXPLOSION HAZARDS	None			

APPENDIX 6 (Continued)
Tracer Dye Material Safety Data Sheet (MSDS) and Engineering Letter of Approval

- 4. HEALTH HAZARD DATA -

THRESHOLD LIMIT VALUE	None
EFFECTS OF OVEREXPOSURE	No effects.
EMERGENCY AND FIRST AID PROCEDURES	N/A

- 5. REACTIVITY DATA -

STABILITY			
UNSTABLE	STABLE	CONDITIONS TO AVOID	
	XXX		

INCOMPATIBILITY (materials to avoid)	Bleach Products
HAZARDOUS DECOMPOSITION PRODUCTS	None

HAZARDOUS POLYMERIZATION			
May Occur	Will not Occur	CONDITION TO AVOID	
	XXX		

- 6. SPILL OR LEAK PROCEDURES -

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Will not burn - suggest sanitary landfill in accordance with local, state, and federal regulations
WASTE DISPOSAL METHOD	See above

- 7. SPECIAL PROTECTION INFORMATION -

RESPIRATORY PROTECTION (Specify Type)	This product tends to be dusty. Ventilation or dust mask would be helpful, but not necessary		
VENTILATION	LOCAL EXHAUST: XXX	SPECIAL:	
	MECHANICAL:	OTHER:	
PROTECTIVE GLOVES	Rubber	EYE PROTECTION	
OTHER PROTECTIVE EQUIPMENT	Color stains are aggravating but not hazardous. Any protection from dust is generally appreciated.		

- 8. SPECIAL PRECAUTIONS -

PRECAUTIONARY LABELLING	None
OTHER HANDLING AND STORAGE CONTITIONS	Keep in closed containers.

APPENDIX 6 (Continued)
Tracer Dye Material Safety Data Sheet (MSDS) and Engineering Letter of Approval

Internal Letter — Rockwell International

Date: September 20, 1989 — No.: 8.79

TO (Name, Organization, Internal Address): Those Listed

FROM (Name, Organization, Internal Address, Phone):
D. W. Walker
Plant Utilities Eng.
Building 130
5450 (dig. pager 320)

SUBJECT: TRACER DYE INJECTION IN BUILDING DRAIN SYSTEMS

Under current project Authorization No. 492249 - Drains Identification Study, Facilities Engineering personnel will be injecting tracer dye into the process drains in the buildings which are connected or suspected to be connected to the process waste lines. This tracer dye test will provide a positive identification of the drain connections and will identify if there are cross connections between the process waste line(s) and the sanitary waste line(s).

The test will be conducted using an Industrial Hygiene recommended FD&C Red 40 dye. The Material Safety Data Sheet (MSDS) for this dye is on file in the Industrial Hygiene office and is attached. The dye is a dark red dye used for food, drug and cosmetic which is not a hazardous material and has no known significant harmful environmental effect. The dye will be mixed in water to produce a dark red solution. Approximately 1 - 2 gallons of this solution will be injected into the process drain followed by approximately 2 - 3 gallons of clear water. Facilities Engineering personnel will be observing the outcome of the drain lines at various locations in the building drain system. No sealed drains in areas containing radioactive or other hazardous materials will be opened.

The tracer dye test will be conducted for all buildings on plant site which have process drains. The test is tentatively scheduled to begin on September 25, 1989, and will continue through May 1990. Facilities Engineering will notify the Building Manager, Plant Protection, HS&E Area Engineer, Sewage Treatment Plant, Utility Area Manager, and RCRA/CERCLA Office of the date and building of the test 24 hours prior to the beginning of each test. In addition, Facilities Engineering will verbally notify the above offices 1 hour prior to actual dye injection.

If you have any questions or comments, please feel free to contact me at extension 5450 or digital pager 320.

D. W. Walker, Project Engineer
Plant Utilities Engineering

APPENDIX 6 (Continued)
Tracer Dye Material Safety Data Sheet (MSDS) and Engineering Letter of Approval

TRACER DYE INJECTION TEST

APPROVED: _____ 9/6/89
C. E. Beutler
Facilities Engineering

APPROVED: _____
K. B. McKinley
RCRA/CERCLA

APPROVED: _____
J. R. Marshall
Plant Services

APPROVED: _____
E. R. Young
Plant Security

APPROVED: _____
E. R. Naimon
Waste Operations

APPROVED: _____
G. W. Coles
Utilities

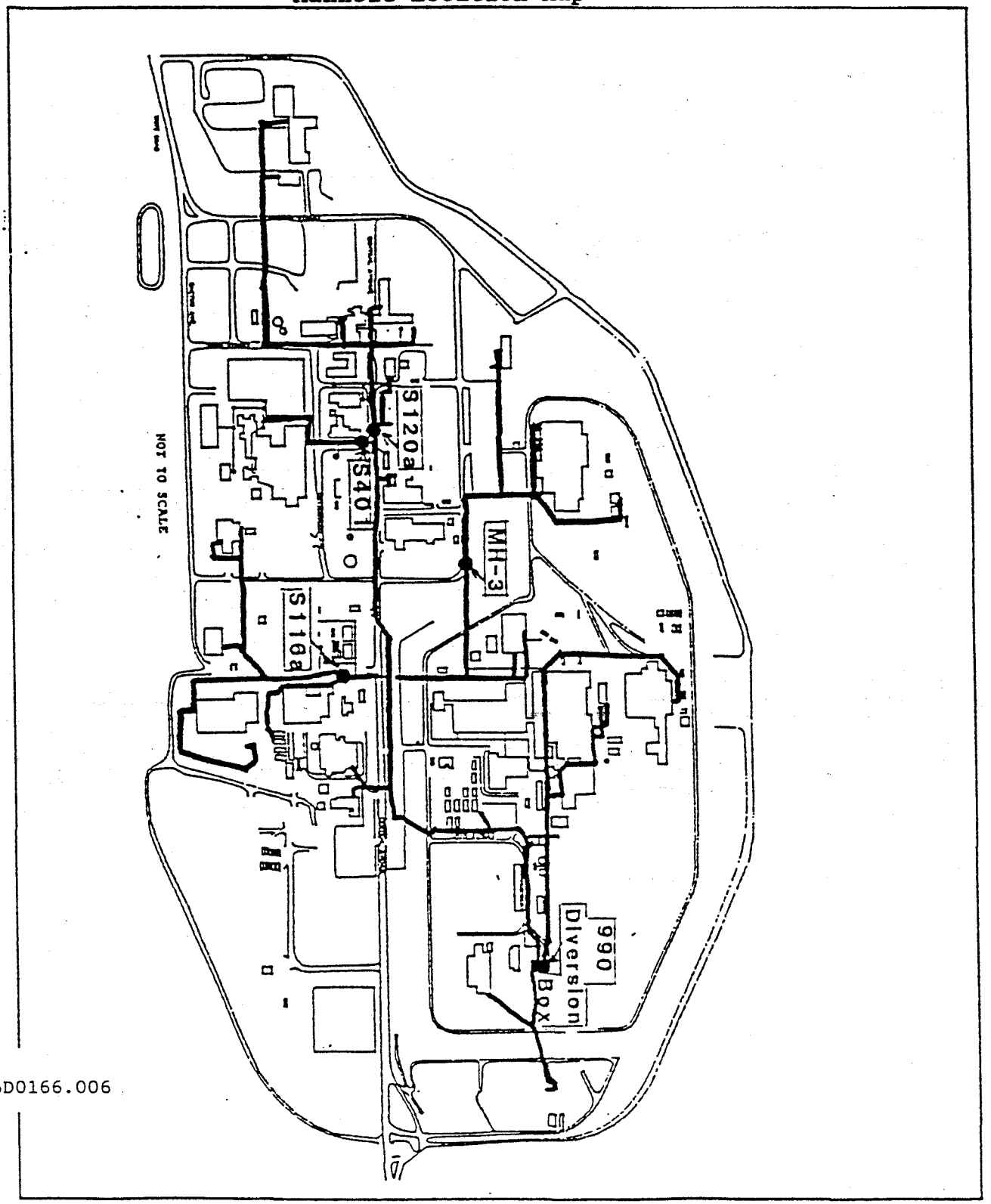
APPROVED: _____
J. D. McCarthy
Nuclear/Industrial Safety

APPROVED: _____
R. E. Richardella
HS&E Engineering

Distribution

C. E. Beutler
M. G. Colalancia
G. W. Coles
A. Eden
D. W. Ferrera
J. P. Koffer
J. R. Marshall
J. D. McCarthy
K. B. McKinley
E. R. Naimon
R. E. Richardella
V. Terkun
E. R. Young

APPENDIX 7
Manhole Location Map



856D0166.006

FIELD LOCATING CHEMICALS OF CONCERN

EG&G ROCKY FLATS PLANT	Manual Number:	5-21000-OPS
EM OPERATIONS	Procedure No:	SW.30, Rev 0
PROCEDURES MANUAL	Page:	PAGE 1 OF 14
	Effective Date:	9/25/92
CATEGORY 2	Organization:	SWD

TITLE:
FIELD LOCATING
CHEMICALS OF CONCERN

Approved By:

George H. Setlock 9/25/92
Director, Environmental Protection Dept. Date

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1. PURPOSE

The purpose of this procedure is to provide instructions for performing a Chemicals of Concern (COC) identification inspection as part of the Drain Identification Study (DIS) to ensure that unacceptable amounts of hazardous or otherwise inappropriate substances at Rocky Flats Plant (RFP) cannot inadvertently enter the Sanitary Sewer (SS) system.

2. SCOPE

This procedure implements the requirements of the Drain and Effluent Pathway Assessment Criteria established by the Surface Water Division (SWD) of Environmental Management EG&G, RFP.

This procedure addresses inspection within the walls of every existing structure at RFP to locate, identify, and document on log sheets Chemicals of Concern.

This procedure address activities for the drain identification study, project #986685.

3. REFERENCES

3.1 Primary References

3.1.1 SWD Chemicals of Concern List

3.1.2 DIS Field Log Books

3.1.3 DIS Reference Book

3.1.4 EG&G Health & Safety Practices Manual, Section 2.08

3.1.5 RFP Standard SX-164

3.1.6 RFP Training Users Manual 1-10000-TUM

3.2 Secondary References

3.2.1 NPDES FFCA Implementation plan

3.2.2 3-21000-ADM-17.01, Quality Records Management

3.2.3 Health & Safety Practices Manual, Section 2.08

3.2.4 DEPARTMENT OF ENERGY (DOE) ORDERS:

a. Doe Order 5480.4 Environmental Protection, Safety and Health Protection Standards

b. Doe Order 6430.1A General Design Criteria

- Section 1300-8 Special Facilities - Waste Management
- Section 1300-9 Special Facilities - Effluent Control and Monitoring
- Section 1323-5 Special Facilities - Radioactive Liquid Waste Facilities

3.2.5 ENVIRONMENTAL PROTECTION AGENCY (EPA) REGULATIONS:

a. 40 CFR 122 National Pollution Discharge Elimination System Permit Regulations

b. 40 CFR 131 Procedures for Approving State Water Quality Standards

3.2.6 COLORADO WATER QUALITY CONTROL ACT:

a. CRS 35-8 Colorado Water Quality Control Act

b. 5 CCR 1002 - Regulations for the State Discharge Permit System

3.2.7 Conduct of Engineering Manual Section 6.7

3.2.8 Conduct of Engineering Manual DES-19

3.2.9 Conduct of Engineering Manual DES-68A

4. LIMITATIONS AND PRECAUTIONS

4.1 Personnel shall consider (including review of the material safety data sheets for unfamiliar chemicals) the potential hazards of all chemicals and waste materials in the area of inspection and not put themselves or others at undue risk.

5. PREREQUISITES

5.1 Personnel shall be current on all training required, per the Training Users Manual, 1-10000-TUM, to perform the tasks described in this procedure.

5.2 Personnel shall be aware of and perform all requirements (i.e., Work Permits, Plan of the Day, appropriate notification, etc.) prior to entering a building or area.

6. INSTRUCTIONS

6.1 Materials

6.1.1 Remove the Chemicals of Concern Log Sheets (Appendix 1), Secondary Containment Log Sheets, and corresponding Background Layouts from the **DIS Field Log Book** and replace that section with a sign out sheet (see Appendix 3)

6.2 Inspect Rooms for Chemicals of Concern

NOTE

If a room is locked or requires security escort, then note the situation on the COC Log Sheet under comments and establish entry at another time.

NOTE

If a room requires protective cloths, breathing air or is off limits because of excessive danger, then entry need not be pursued. The room is to be declared a Potential Hazard and the situation is to be noted on the COC Log Sheet under comments.

6.2.1 Examine each room for the presents of products or materials, labeled or unlabeled, in liquid or fine powder form (chemicals), and/or storage and conveyance equipment (devises) that may contain or may have contained products or materials in liquid or fine powder form.

6.2.1.1 If no chemicals, and/or devises are present in the room, then document as such on the COC Log Sheet.

6.2.1.2 If unlabeled chemicals, and/or devises are present, then document the visual appearance (color, etc), location and container size on the COC Log Sheet.

6.2.1.3 If labeled chemicals and/or devises are present, then compare labeled materials and primary container sizes to the SWD COC list.

a. If chemicals present are on the SWD COC list and the container exceeds the SWD limit, then list the product, the primary container (type and size), and secondary containment (when present), on the COC Log Sheet.

NOTE

COC in stationary containers, containers large enough to require mechanical assistance to transport (forklift, dolly, truck, crane, etc.), and some Satellite Collection Areas, are required to have secondary containment (Pits, burms, walls, etc). This secondary containment shall be inspected (See Section 6.4)

b. If more than three chemicals on the SWD COC List are present in the room, but none of the container exceed the SWD limit, then based on the SWD Limit and primary containment size, determine the three (3) most potentially hazardous products or chemicals and document them on the COC Log Sheet and include a general comment as to the balance of chemicals in the room or condition of the area under the comments section of the COC Log Sheet.

c. If chemicals are present in the room, that are not on the SWD COC List, but your experienced judgement detects a potential problem, then record the general situation (e.g., house keeping, general types and amount of chemicals, etc.) under the comments section of the COC Log Sheet.

6.3 Investigate Transporting and Usage

NOTE
When a COC source is discovered, then the transportation and usage must be investigated.

6.3.1 Establish communication with the parties responsible for the COC (workers, managers, etc.) to determine the source, purpose, usage, storage, conveyance and route of transportation used associated with the COC.

6.3.2 Walk the transportation route (this includes tracing pipe lines transporting a COC) from it's source, to it's conclusion, documenting each room with potential to exceed an SWD COC limit, as a Potential Hazard Area (PHA) on the COC Log Sheet and clearly marking the route on a Building Background Layout (Floor Plan).

6.4 Inspect Secondary Containment

NOTE
Secondary containment need only be investigated if a COC is located in a fixed container, the container is large enough to require mechanical assistance to transport (forklift, dolly, truck, crane, etc.), or is a Satellite Collection Area requiring secondary containment.

6.4.1 Inspect primary containment area for secondary containment.

6.4.1.1 If secondary containment does not exist, then document the COC, the primary container size and type, and put an x or a check in the "No!" column of the Secondary Containment Log Sheet (Appendix 2)

6.4.2 Document the room(s), chemical, primary containment, and visual observations in the appropriate columns on the Secondary Containment Log Sheet, and indicate the general area of the secondary containment on the background layout.

6.4.3 Inspect secondary containment area for effluent pathways (drains, cracks, etc.).

6.4.3.1 Document all effluent pathways present within the secondary containment.

a. Note on the Secondary Containment Log Sheet, the kind and amount of each type of effluent pathway present and indicate the general location on a Building Background Layout (Floor Plan) using the appropriate symbols (Appendix 4).

6.4.4 Sign and date all marked up Background Layouts and sign the COC and Secondary Containment Log Sheets.

6.5 Review Documents

6.5.1 Review all field generated documents (COC Log Sheets, Secondary Containment Log Sheets, and background layouts) for clarity, consistency and completeness.

6.5.2 Field verify areas to clarify documentation if necessary.

6.5.3 Revise or reconstruct field gernerated documents (log sheets and background layouts) for clarity, neatness, and consistency in symbols (See Appendix 4) if necessary.

NOTE

If original field generated documents have been reconstructed, then the signed and dated originals must be filed in the DIS document file.

6.6 Finalize Documents

6.6.1 Ensure that all original and reconstructed marked up Background Layouts and the Log Sheets have been signed and dated.

6.6.2 Make copies of the COC and Secondary Containment Log Sheets and Background Layouts finish drafts.

6.6.3 File the finish drafts under the appropriate section of the DIS Master Log Book and place the copies in the appropriate Field Log Book.

6.6.4 Mark an X under COC, on the Status Check List, in the Field Log Book and remove the sign out sheet (See Appendix 3).

7. RECORDS

All

The log sheets and background layouts are quality records and the originals shall be submitted to the EMD Records Center per 3-21000-ADM-17.01, Quality Records Management, for inclusion in the DIS Master Log Book.

APPENDIX 1
Chemicals of Concern (COC) Log Sheets

CHEMICALS OF CONCERN (COC)
LOG SHEET

RMH	Chemical of concern	Comments:

INSPECTED BY: _____ Signed _____ Dated _____

INSPECTED BY: _____ Signed _____ dated _____

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APPENDIX 2
Secondary Containment Log Sheet

SECONDARY CONTAINMENT LOG SHEET

ROOM	CHEMICAL OF CONCERN	CONTAINER SIZE/TYPE	SECONDARY CONTAINMENT				DRAINS? AMT/LBL
			NO!	INADEQUATE SIZE	INADEQUATE AREA	INADEQUATE STRUCTURE	

INSPECTED BY: _____ Dated _____
Signed

INSPECTED BY: _____ Dated _____
Signed

APPENDIX 3
Sign Out Sheet

FIELD LOG BOOK

SIGN OUT SHEET

Name_____

Date_____

Building_____

Log Sheets_____

Drawings_____

APPENDIX 4
Symbols, Terms and Definitions

Symbols

DRAWING AND LOG SHEET
SYMBOL LEGEND

SYMBOL	
SS	Sanitary Sewer Drain
PW	Process Waste Drain
FD	Floor Drain
SH	Shower
SU	Sump
TR	Trench
UT	Utility Trench
U/L	Unlabeled Drain
WWA	Wet Work Area
o	Approx. Drain location
	Secondary Containment

APPENDIX 5 (Continued)
Symbols, Terms and Definitions

TERMS & DEFINITIONS

Effective Secondary Containment - A wall or barrier constructed or installed to contain or restrict effluent from the area of primary containment (Tank(s) or Container(s)) that is 100% of Primary Containment or 100% of the largest Primary Containment, shows no signs of defect or compromise, and has an adequate capture area.

Effluent Pathways - Any labeled or unlabeled access to the Sanitary Sewer, Process Waste, or Foundation Drain Systems (e.g., All trenches, floor penetrations, cracks, pipe runs, expansion joints, etc.).

DYE TESTING FOUNDATION FOOTING DRAINS

EG&G ROCKY FLATS PLANT	Manual Number:	5-21000-OPS
EM OPERATIONS	Procedure No:	SW.33, Rev 0
PROCEDURES MANUAL	Page:	PAGE 1 OF 22
	Effective Date:	9/29/92
CATEGORY 2	Organization:	SWD

TITLE:
DYE TESTING
FOUNDATION/FOOTING DRAINS

Approved By:

George H. Setlock 9/29/92
for Manager, Surface Water Division Date

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1. PURPOSE

The purpose of this procedure is to provide instructions for Dye Testing Foundation drains at the Rocky Flats Plant (RFP) to ensure that hazardous or otherwise inappropriate substances at Rocky Flats Plant cannot inadvertently enter the Sanitary Sewer (SS) system.

2. SCOPE

This procedure implements the Dye Testing of Foundation drains at RFP to detect the potential for a cross connection with the Sanitary Sewer system.

This procedure addresses the visual detection of dye at selected manholes, the 990 Diversion Box, and the anticipated Foundation drain Flow Termination Point (FTP).

3. REFERENCES

3.1 Primary References

3.1.1 Dye Testing Health and Safety Plan

3.1.2 RFP Engineering Document Control Facilities Engineering Drawings

3.1.3 RFP Foundation Drain Report

3.1.4 RFP Training Users Manual 1-10000-TUM

3.1.5 RFP EM/SWD 3-21000-ADM-17.01, QA Records Management.

3.2 Secondary References

3.2.1 NPDES FFCA Chromic Acid Incident plan

3.2.2 DEPARTMENT OF ENERGY (DOE) ORDERS:

a. DOE Order 5480.4 Environmental Protection, Safety and Health Protection Standards

b. DOE Order 6430.1A General Design Criteria

- Section 1300-8 Special Facilities - Waste Management
- Section 1300-9 Special Facilities - Effluent Control and Monitoring
- Section 1323-5 Special Facilities - radioactive Liquid Waste Facilities

3.2.3 ENVIRONMENTAL PROTECTION AGENCY (EPA) REGULATIONS:

a. 40 CFR 122 National Pollution Discharge Elimination System Permit Regulations

b. 40 CFR 131 Procedures for Approving State Water Quality Standards

3.2.4 COLORADO WATER QUALITY CONTROL ACT:

a. CRS 35-8 Colorado Water Quality Control Act

b. 5 CCR 1002 - Regulations for the State Discharge Permit System

3.2.5 Conduct of Engineering Manual

a. Section 6.7

b. DES-19

c. DES-68A

4. LIMITATIONS AND PRECAUTIONS

4.1 Personnel in the vicinity of an open manhole or 990 Diversion Box shall consider the potential hazards (e.g., confined space entries, rising & falling water) and not put themselves or others at undue risk.

5. PREREQUISITES

5.1 Personnel shall read and understand the Dye Testing Health and Safety plan.

5.2 Personnel shall be current on all training required, per the Training Users Manual, 1-10000-TUM, to perform the tasks described in this procedure.

5.3 Personnel shall be aware of and perform all requirements (i.e., Work Permits, Plan of the Day, appropriate notification, etc.) prior to entering a building or area.

6. INSTRUCTIONS

6.1 Preparation

6.1.1 Obtain copies of engineering reference Drawings (Floor Plans, Site Utilities Plans, Plumbing, Sanitary Sewer, and Foundation drawings) from Engineering Document Control (building 130), the building representative, or other sources.

6.1.2 Obtain access to copies of the SWD Foundation Drain Report, the SWD approved "Baseline" time for the building (if established), and investigate the potential for historical data sources which may be helpful in location foundation drains.

6.1.3 Using information gathered in Sections 6.1.1 through 6.1.2, propose the location of the Foundation Drain, and a feasible access point.

6.1.4 Using the information gathered in Sections 6.1.1 through 6.1.2 consider if the Foundation drain is pumped or is gravity flow and determine a feasible Flow Termination Point.

6.1.5 Using the Site Utilities Plan and the Location Map (Appendix 7), identify the down gradient manhole(s) (if any), associated with the building Sanitary Sewer System and/or Foundation Drain to be dye tested.

6.1.6 Field walk down the area to verify determinations made in Sections 6.1.3 through 6.1.5.

6.1.7 Obtain Dye Test Ready Review Sheets (Appendix 3), Dye Test Log Sheets (Appendix 1), and Dye Sighting (DS) Log Sheets (Appendix 2) from RFP Forms Control.

6.1.8 Complete the Dye Test Ready Review Sheet (Appendix 3) including the appropriate notifications.

6.1.9 Obtain Dye Test Log Sheet (Appendix 2) and Dye Sighting (DS) Log Sheet (Appendix 3) forms from RFP Forms Control.

6.1.10 Obtain materials listed in Appendix 4.

6.1.11 Take appropriate actions to gain access to the building to be dye tested and the dye sighting areas.

6.1.12 Establish a source of water and the most reasonable method of transportation (e.g., hose, bucket, etc) available to transport water to the dye injection sites.

6.1.13 Station Dye Spotters at the down gradient manhole and/or at the 990 Diversion Box to visually inspect the sanitary waste water for color changes indicating the presence of dye.

6.1.14 If an SWD approved "Baseline" time does not exist, then establish a "Baseline" time for the building as instructed in Section 6.2 .

6.2 Establish a "Baseline" Time

6.2.1 Using information gathered in Sections 6.1.1 through 6.1.2, locate a known SS drain (Toilet, sink, etc.) furthest from the main drain lines exit point from the building.

6.2.2 Mix one tablespoon of FD&C red dye 40 with 5 gallons of water until all granules have dissolved (Dye Concentrate).

6.2.3 Inject dye into the drain(s) as follows:

6.2.3.1 For toilets

a. Dispense 1 tablespoon of FD&C red dye 40 (Appendix 6) directly into the toilet(s).

b. Flush toilet at least 5 times ensuring that all dry granules are flushed into and down the drain with the water.

6.2.3.2 For building drains (sinks, floor drains, etc.)

a. Pour 1 to 2 pints of concentrate into a drain.

b. Flush with a minimum of 20 gallons of water.

6.2.4 Document the time of dye injection on the Dye Test Log Sheet and alert the Dye Spotters, by radio, to start watching for dye traces at the Dye Sighting locations (See Section 6.4).

6.2.5 After receiving notification from the Dye Spotter(s) that dye has been detected, document the time(s) and location(s) on the Dye Test Log Sheet.

6.2.6 Note the total time it took for dye to reach each location on the Dye Test Log Sheet under comments.

NOTE

This duration becomes the suggested "baseline" for flow to go from the building to the SS dye spotting locations. The baseline is only a guideline. Experienced judgement shall be required in making determinations based on this factor.

6.2.7 Allow twice the "baseline" time to pass before injecting dye into a Foundation drain.

6.3 Dye Testing a Foundation Drain

6.3.1 Establish a "Baseline" time for the building as instructed in Section 6.2 or use an SWD approved previously established "Baseline" time.

6.3.2 Mix one tablespoon of FD&C red dye 40 with 5 gallons of water until all granules have dissolved (Dye Concentrate).

6.3.3 Pour 1 to 5 gallons of concentrate into the Foundation Drain access point.

NOTE

If access point is at a manhole follow the instructions in Sections 6.4.1.1 prior to injecting dye.

6.3.4 Document the time of dye injection on the Dye Test Log Sheet and alert the Dye Spotters, by radio, to start watching for dye traces at the Dye Sighting locations (See Section 6.4).

6.3.5 Flush access point with water until:

6.3.5.1 the water reaches a level of pump discharge (when applicable), or

6.3.5.2 the anticipated FTP begins discharging traces of dye, or

6.3.5.3 a Dye Spotter reports a sighting, or

6.3.5.4 at least twice the "Baseline" time has passed.

6.3.6 Document the time(s) and location(s) of all dye sightings on the Dye Test Log Sheet.

6.3.6.1 If dye is not detected at the SS Dye Spotting locations or the anticipated FTP within twice the "baseline" time, then the drain may be documented as not going to the SS but further investigation of the FTP and a re-Dye Testing is recommended.

6.3.6.2 If dye does appear at a SS Dye Spotting location, then the drains must be documented as going to the SS.

NOTE

After injecting dye into a Foundation drain, allow the dye at least twice the "baseline" time to reach one of the officially designated dye sighting location(s) before Dye Testing in another building.

6.3.7 Sign Dye Test Log Sheets, at the end of each day.

6.4 **Dye Sighting**

Read and understand the Dye Test Health & Safety Plan.

NOTE

The Dye Injector shall send notification, by radio, to all Dye Spotters at the time the dye is injected. If a color, other than red, should appear at the Sanitary Sewer while dye testing a drain or a series of drains, then all discharging to the SS system is to be discontinued for two (2) hours and that drain is to be re-dye tested or, the drain is to be treated as Sanitary Sewer.

6.4.1 Manhole Dye Sighting Location

WARNING

DO NOT ENTER THE MANHOLE AND USE EXTREME CAUTION WHEN REMOVING THE MANHOLE COVER!

6.4.1.1 Remove the cover on each manhole and Test for gasses following the Health & Safety Plan.

6.4.1.2 Stand above the manhole while lowering the Backdrop Extension (See Appendix 5) down into the flow of water.

6.4.1.3 Upon receiving notification from the Dye Injector that dye has been introduced into the system, shine a high intensity light down on the face of the white backdrop and watch for the dye to appear in the stream of water for twice the "Baseline" time.

6.4.1.4 Notify the Dye Injector by radio immediately upon sighting dye.

6.4.1.5 Document the date, time and location of each sighting on a DS Log Sheet.

6.4.1.6 Repeat steps 6.4.1.2 through 6.4.1.5 for each dye sighting at that location.

6.4.1.7 Sign each DS Log Sheets, at the end of the day.

6.4.2 990 Diversion Box Dye Sighting Location

WARNING

DO NOT ENTER THE MANHOLE AND USE EXTREME CAUTION WHEN REMOVING THE GRILLE ON THE 990 DIVERSION BOX.

6.4.2.1 Remove grating from 990 Diversion Box following the Dye Test Health & Safety Plan.

6.4.2.2 Stand above the 990 Diversion Box on the fall side while lowering the Backdrop Extension (See appendix 5) down into the flow of water.

6.4.2.3 Upon receiving notification from the Dye Injector that dye has been introduced into the system, shine a high intensity light down on the face of the white backdrop and watch for the red dye to appear in the stream of water crossing over it for twice the "Baseline" time.

6.4.2.4 Notify the Dye Injector by radio immediately upon sighting dye.

6.4.2.5 Document the date, time and location of each sighting, on the DS Log Sheet.

6.4.2.6 Repeat steps 6.4.2.1 through 6.4.2.5 for each required dye sighting at that location.

6.4.2.7 Sign each DS Log Sheets, at the end of the day.

6.4.3 <u>Anticipated Flow Termination Point</u> Dye Spotting Location

6.4.3.1 Establish a safe location above the FTP for visual inspection of the water flow.

6.4.3.2 Upon receiving notification from the Dye Injector that dye has been introduced into the system, watch for the red dye to appear in the stream of water for twice the "Baseline" time.

6.4.3.3 Notify the Dye Injector by radio immediately upon sighting dye.

6.4.3.4 Document the date, time and location of each sighting on a DS Log Sheet.

6.4.3.5 Repeat steps 6.4.3.1 through 6.4.3.4 for each dye sighting at that location.

6.4.3.6 Sign each DS Log Sheets, at the end of the day.

6.5 Review Documents

6.5.1 Review the Dye Test and DS Log Sheets for consistency and completeness.

6.5.2 Revise of reconstruct the Dye Test and Dye Sighting Log Sheets for consistency and neatness.

6.6 Finalize Documents

6.6.1 Sign and date all Dye Test and DS Log Sheets.

6.6.2 Send log sheets to RFP EMD Records Center to be filed under the appropriate section of the DIS Master Log Book.

7. RECORDS

The log sheets are quality records and the originals shall be submitted to the EMD Records Center per 3-21000-ADM-17.01, Quality Records Management, for inclusion in the DIS Master Log Book.

APPENDIX 1
Dye Test Log Sheet

DYE TEST LOG SHEET

BUILDING #_____

ROOM #	RISK AREA	TEST DATE	DRAIN TYPE	INJEC TIME	VERIF TIME	RESULTS SS / PW	COMMENTS/RECOMMENDATION
	N/A		*TEST				

* This known sanitary drain was tested to establish the time required for the tracer dye to enter the diversion box at building 990.

DYE TESTED BY:_____ WITNESSED BY:_____

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Signed Dated Signed Dated

APPENDIX 2
Dye Sighting (DS) Log Sheet

DYE SIGHTING LOG SHEET
(DS)

Date:_____

Location:_____

Dye Spotter:_____
(please print name)

TIME NOTIFIED	TIME OF SIGHTING	COMMENTS

_____
(signature)

APPENDIX 3
Dye Test Ready Review Sheet and Contact List

DYE TEST
READY REVIEW SHEET

BUILDING#_____

SECURITY CLEARANCE REQUIRED	YES	NO	
TRAINING REQUIREMENTS COMPLETE	YES	NO	
ON PLAN OF THE DAY	YES	NO	NOT REQ
WORK PERMIT	YES	NO	NOT REQ

CONTACT LIST

Contact each group or individual giving them:

24 Hours Notice & 1 Hour Notice

	EXT	PAGE	DATE
BUILDING OPERATIONS MANAGER	X_____	D_____	_____
BUILDING H&S AREA ENGINEER	X_____	D_____	_____
BUILDING LO/TO MANAGER	X_____	D_____	_____
PLANT PROTECTION	X2464		_____
WALKIE-TALKIE (to get walkie-talkies)	X6429		_____
RCRA/CERCLA - ALLEN SHUBERT	X5251	D1177	_____
WASTE WATER TREATMENT PLANT (WWTP) - FRANK HUFFMAN	X4502	D3112	_____
WASTE OPERATIONS MANAGER - BOB MORGAN	X6013	D1855	_____
SURFACE WATER DIVISION (SWD) - BOB FIEHWEG	X8542	D3132	_____

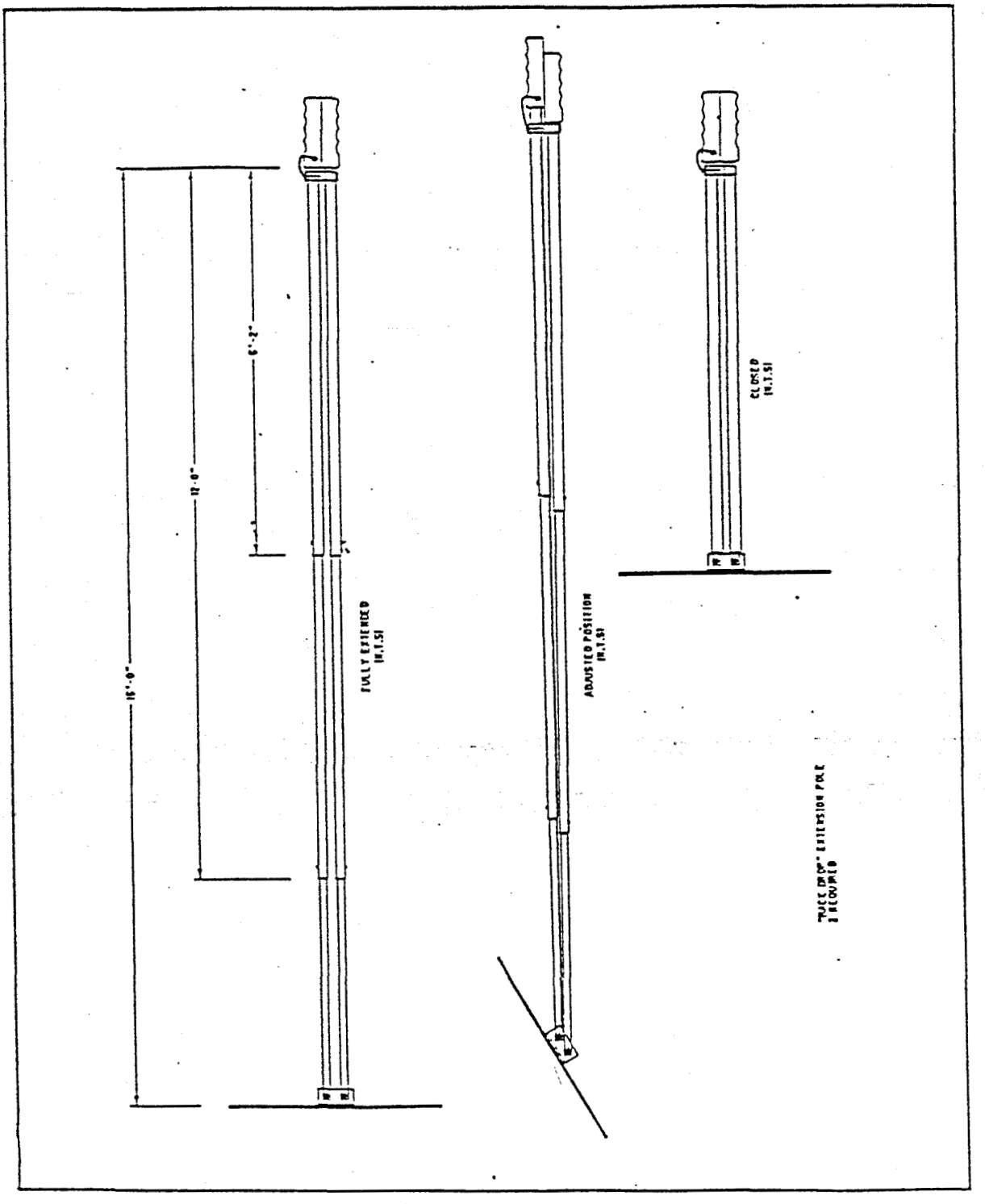
APPENDIX 4
Work Materials List

WORK MATERIALS

Prior to Dye Testing, the following items must be obtained:

- Dye Test Ready Review Sheet and Contact List
- Engineering Sewer Drawings (copies)
- Drain Location Sketch(s) (copies)
- FD&C Red #40 dye and a one tablespoon measuring devise.
- Water supply must be located
- 5 gallon bucket
- 1 gallon container
- Ready made drain covers
- Four radios set at the same frequency and approved by Security
- High-power flashlight
- Dye Test Log Sheets
- Dye Sighting (DS) Log Sheets
- Writing Surface (Clipboard)
- Writing Instruments
- Protective Clothing (Coveralls, latex gloves, etc.)
- HNu or OVA Meter
- LEL/O_2 Meter
- Backdrop Extension (may be checked out from Surface Water Division of Environmental Management)

APPENDIX 5
Backdrop Extension



APPENDIX 6
Tracer Dye Material Safety Data Sheen (MSDS) and Engineering Letter of Approval

Internal Letter — Rockwell International

Date: September 20, 1989 — No.: 8.79

TO (Name, Organization, Internal Address): Those Listed

FROM (Name, Organization, Internal Address, Phone): D. W. Walker, Plant Utilities Eng., Building 130, 5450 (dig. pager 320)

SUBJECT: TRACER DYE INJECTION IN BUILDING DRAIN SYSTEMS

Under current project Authorization No. 492249 - Drains Identification Study, Facilities Engineering personnel will be injecting tracer dye into the process drains in the buildings which are connected or suspected to be connected to the process waste lines. This tracer dye test will provide a positive identification of the drain connections and will identify if there are cross connections between the process waste line(s) and the sanitary waste line(s).

The test will be conducted using an Industrial Hygiene recommendec FD&C Red 40 dye. The Material Safety Data Sheet (MSDS) for this dye is on file in the Industrial Hygiene office and is attached. The dye is a dark red dye used for food, drug and cosmetic which is not a hazardous material and has no known significant harmful environmental effect. The dye will be mixed in water to produce a dark red solution. Approximately 1 - 2 gallons of this solution will be injected into the process drain followed by approximately 2 - 3 gallons of clear water. Facilities Engineering personnel will be observing the outcome of the drain lines at various locations in the building drain system. No sealed drains in areas containing radioactive or other hazardous materials will be opened.

The tracer dye test will be conducted for all buildings on plant site which have process drains. The test is tentatively scheduled to begin on September 25, 1989, and will continue through May 1990. Facilities Engineering will notify the Building Manager, Plant Protection, HS&E Area Engineer, Sewage Treatment Plant, Utility Area Manager, and RCRA/CERCLA Office of the date and building of the test 24 hours prior to the beginning of each test. In addition, Facilities Engineering will verbally notify the above offices 1 hour prior to actual dye injection.

If you have any questions or comments, please feel free to contact me at extension 5450 or digital pager 320.

D. W. Walker, Project Engineer
Plant Utilities Engineering

APPENDIX 7 (Continued)
Tracer Dye Material Safety Data Sheet (MSDS)

TRACER DYE INJECTION TEST

APPROVED: _____ 9/6/92
C. E. Beutler
Facilities Engineering

APPROVED: _____
K. B. McKinley
RCRA/CERCLA

APPROVED: _____
J. R. Marshall
Plant Services

APPROVED: _____
E. R. Young
Plant Security

APPROVED: _____
E. R. Naimon
Waste Operations

APPROVED: _____
G. W. Coles
Utilities

APPROVED: _____
J. D. McCarthy
Nuclear/Industrial Safety

APPROVED: _____
R. E. Richardella
HS&E Engineering

Distribution

C. E. Beutler
M. G. Colalancia
G. W. Coles
A. Eden
D. W. Ferrera
J. P. Koffer
J. R. Marshall
J. D. McCarthy
K. B. McKinley
E. R. Naimon
R. E. Richardella
V. Terkun
E. R. Young

APPENDIX 7 (Continued)
Tracer Dye Material Safety Data Sheet (MSDS)

ROBERT KOCH INDUSTRIES INC.

ROUTE 1, BOX 4HH BENNETT, CO 80102 (303) 644-3763

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: FD&C Red #40 Color Index no: 16035

CHEMICAL NATURE: Food Red 17

% ACTIVITY: 90 - 93%

- 1. PHYSICAL DATA -

BOILING POINT, 760 mm Hg	N/A	FREEZE POINT	N/A
SPECIFIC GRAVITY	N/A	VAPOR PRESSURE AT 20°C	N/A
VAPOR DENSITY	N/A	SOLUBILITY IN H_2O	Approx 25%
PER CENT VOLATILES BY WEIGHT	N/A	IONIC NATURE	N/A
APPEARANCE AND ODOR	Red Granular - Odor none		

- 2. HAZARDOUS INGREDIENTS -

MATERIAL	%	TLV (Units)
FD&C colors are not hazardous material - so not fall under the jurisdiction of D.O.T.		

- 3. FIRE AND EXPLOSION HAZARD DATA -

FLASH POINT (test method)	N/A	AUTOIGNITION TEMPERATURE			N/A
FLAMMABLE LIMITS IN AIR, % by volume		LOWER	N/A	UPPER	N/A
EXTINGUISHING MEDIA	Will not burn				
SPECIAL FIRE FIGHTING PROCEDURES	None				
UNUSUAL FIRE AND EXPLOSION HAZARDS	None				

APPENDIX 7 (Continued)
Tracer Dye Material Safety Data Sheet (MSDS)

- 4. HEALTH HAZARD DATA -

THRESHOLD LIMIT VALUE	None
EFFECTS OF OVEREXPOSURE	No effects.
EMERGENCY AND FIRST AID PROCEDURES	N/A

- 5. REACTIVITY DATA -

STABILITY		
UNSTABLE	STABLE	CONDITIONS TO AVOID
	XXX	

INCOMPATIBILITY (materials to avoid)	Bleach Products
HAZARDOUS DECOMPOSITION PRODUCTS	None

HAZARDOUS POLYMERIZATION		
May Occur	Will not Occur	CONDITION TO AVOID
	XXX	

- 6. SPILL OR LEEK PROCEDURES -

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Will not burn - suggest sanitary landfill in accordance with local, state, and federal regulations
WASTE DISPOSAL METHOD	See above

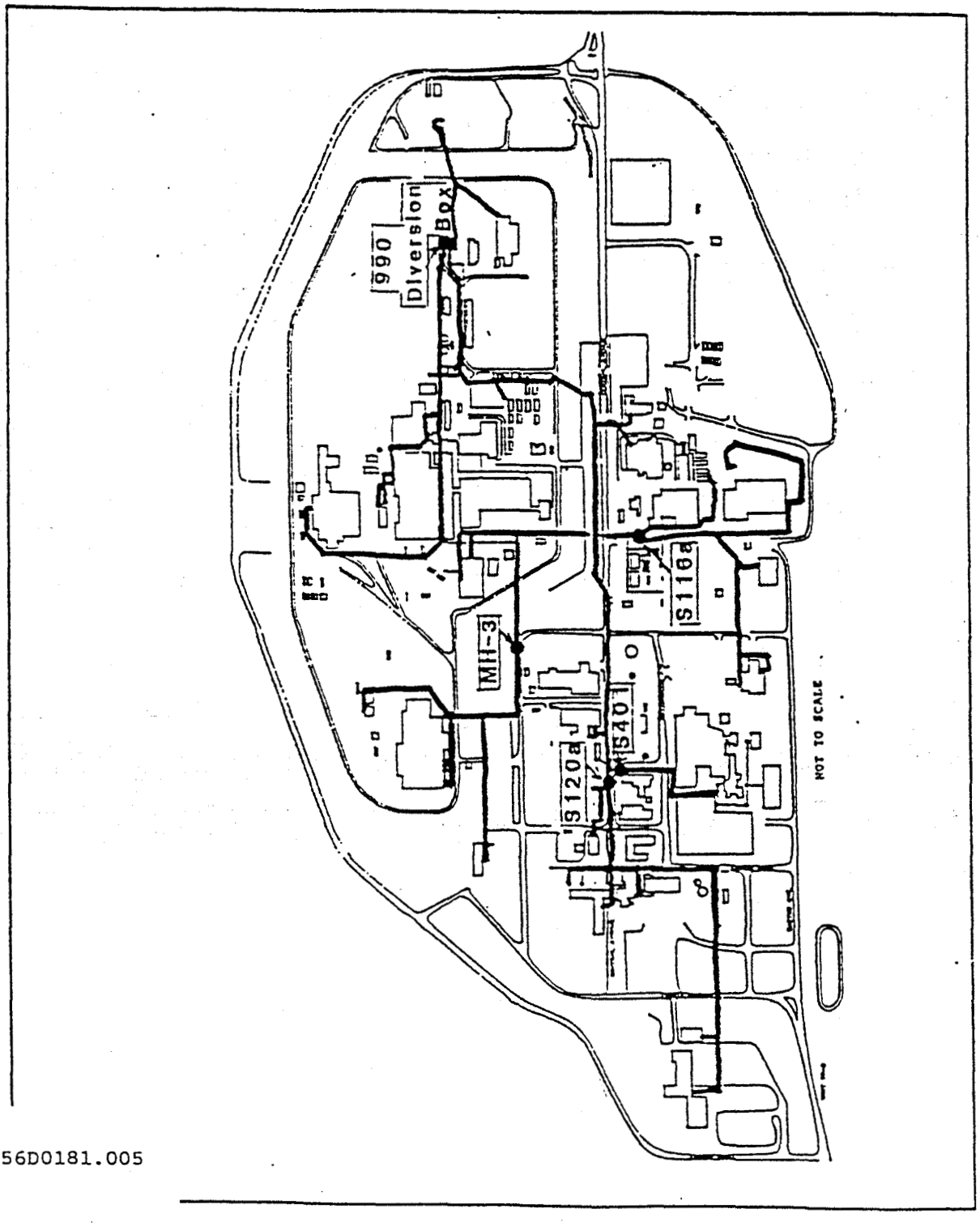
- 7. SPECIAL PROTECTION INFORMATION -

RESPIRATORY PROTECTION (Specify Type)	This product tends to be dusty. Ventilation or dust mask would be helpful, but not necessary		
VENTILATION	LOCAL EXHAUST: XXX	SPECIAL:	
	MECHANICAL:	OTHER:	
PROTECTIVE GLOVES	Rubber	EYE PROTECTION:	
OTHER PROTECTIVE EQUIPMENT	Color stains are aggravating but not hazardous. Any protection from dust is generally appreciated.		

- 8. SPECIAL PRECAUTIONS -

PRECAUTIONARY LABELING	None
OTHER HANDLING AND STORAGE CONDITIONS	Keep in closed containers.

APPENDIX 7
Location Map



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